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 SS72-693 P-40E 49FG (5) No 36 'FS'; Maj Simms 8FS; No. 64 9FS; No. 42 Capt Klack 8FS; No. 85 Lt Tice 9FS
 SS72-694 P-38E F/H (3) 17587 UN-O Maj Ilfrey 'Happy Jacks Go Buggy Texas Terror'; 17854 ES-C Lt Ethell 'Tangerine'; 17991 UN-G Lt Hagenback 'Bat Out of Hell'
 SS72-695 P-39C D/F Airacobra S (4) 'Air-A-Cutie' 8th FG 36 FS; 31st PG 39th PS 1941 Louisiana Manoeuvres 54th FG 57th FS, Alaska 1942
 SS72-696 P-51 B (2) Betty Jane Col. Charles M. McCorkle 31 FG Commanding Officer, 1944, 'Ill Wind' 1st Lt. Nicholas 'Cowboy' Megura, 4th FG, 334 FS, April 1944
 SS72-697 P-51D Mustang Aces (3) Checkertall Clan 'Texas Jessie Big Mike'; Lt. William E Aron 318 FS, 'Honey Bee'; Capt. Barrie S. Davis, 317 FS; Helen Capt. Auther C. Fielder 317 FS, All 325 FG
 SS72-698 Spitfire VIII/Vb Trop (4) Villc 'Lonesome Polecat' 308 FS; 'Fargo Express' 308 FS; 'Lady Ellen III' 308 FS; Vb Tropical 'Dimples' 307 FS, All 31 FG, USAAF Italy 94
 SS72-699 P-39F/P-400 Airacobra (2) 'Air A Cutie' 8th FG 36 FS; 'Macushla' 35 PG

1:48th Scale

SS48-492 P-40E (3) No. 85 'Tarheel' Lt George Preddy 9FS; No. 84 Lt Angel 9FS; White 65 Maj Pokryshev Leningrad 1943
 SS48-493 P-40E (3) No. 36 Capt. Hennon 7FS; Maj Simms 8FS; No. 92 Maj Chennault 11FS, Tigers Head on nose
 SS48-494 P-38E F/H (3) 17587 UN-O Maj Ilfrey 'Happy Jacks Go Buggy Texas Terror'; 17854 ES-C Lt Ethell 'Tangerine'; 17991 UN-G Lt Hagenback 'Bat Out of Hell'
 SS48-495 A-20G (2) 084 321BS 'Little Chief' Overall natural metal; 4671 JJ-3 Olive drab/Neutral grey
 SS48-496 P-51 B (2) Betty Jane Col. Charles M. McCorkle, 31 FG, Commanding Officer 1994; Ill Wind 1st Lt. Nicholas 'Cowboy' Megura, 4th FG, 334 FS, April 1944
 SS48-497 P-51D Mustang Aces (3) Checkertall Clan 'Texas Jessie Big Mike'; Lt. William E Aron 318 FS, 'Honey Bee'; Capt. Barrie S. Davis, 317 FS, All 325 FG
 SS48-498 Spitfire VIII/Vb Trop (4) Villc 'Lonesome Polecat' 308 FS; 'Fargo Express' 308 FS; Vb Tropical 'Dimples' 307 FS, All 31 FG, USAAF Italy 1944
 SS48-499 P-39F/P-400 Airacobra (2) 'Air A Cutie' 8th FG 36 FS; 'Macushla' 35 PG

New MINISTRY OF SMALL AIRCRAFT PRODUCTION DECALS

1:48th Scale

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 MZ4835 A-20G Havoc (4) 321815 W 89BS 'Big Nic' Green Fin tip; 39407 P 675BS 'Green Hornet' Blue fin tip; 39224 5H-E 66BS 'La France Libre' Invasion stripes; 310052/14 Russia
 MZ4836 B-26 Marauder (3) 296185 4T-S; 295867 IH-A1 Pathfinder Sqn Shark mouth; 2107783/23 441BS 'Thumper II'
 MZ4837 Fokker Dr.I (5) Arthur Rahn Jasta 19; Josef Jacobs Jasta 7; August Raben Jasta 18; Jasta 11; Steinhilber Jasta 11
 MZ4838 Luftwaffe Single Seat Night Fighters (6) BF-109G Black N-4 (IV)NJG2; BF-109G Green 3 III NJG11; Red 6 IJG300 Fw-190A White 11 IJG10; Black 8 Unusual RLM75/76 camo; Green 3 IJG300 Haupt. Muller
 MZ4839 P-39 Airacobra (5) No 13 'Hawkeye' 8FG New Guinea; 17341 57FS Alaska; 24724 QV Op. Torch; AH601 UFG01 Sqn RAF; Yellow 46 Russia

New AEROMASTER DECALS

1:72nd Scale

AMD72022 P-40E (K) 5 RSF EW421 DB-H; No 48 11FS Alaska with Tigers Head on nose; No 38 16FS China 1943; No 13 25FS Jinx India 1943; 42-29965 JI Florida 1943. Different shark mouths on all three USAAC aircraft
 AMD72034 BF-109F G Part 2 (6) Red 1 Jagdstaffel 5 Russian Army of Liberation; Yellow 2 Hungarian AF; White 8 Bulgarian AF; III JG 53 Russia 1941; Red 29 IJG302 Finland 1944; F6-Th 1 (F)122 Sicily 1942
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 AMD 72051 RAF Roundels Pree 1942. Types B, A and A1 with fin flashes Hurricane and Spitfire sizes

1:48 scale

AMD48098 Fw-190A Reich Defence Part 3 (5) 9K-red 3 KG51; Yellow I IIJG11; Black 1 JG300; Green 3 Stab II Gruppe; Black 6/70. Wide variety of camos
 AMD48100 Air War over Korea (5) F4U-4 B-314 VF 1333 USS Princeton; F51D 44-74941 36FBS 'Buckeye Blitz VI'; F-86E FU-756 'Heller-Bust X'; F9F-5 D 109 VF-781 USS Oriskany; F-80C FT-591 80FBS 'Spirit of Hobo' Double sheet
 AMD48106 Early Mustangs (6) RCAF Mustang 1 AG367/63-X 400 Sqn; AG522/SYL 400 Sqn; RAF FD472 M 158Sqn; 137367 154 Recon Sqn 'Betty Jane' Italy 1944; A-36 B-1 86FBS 'Robbie'; P-51A 36185 AX-L 111TRS July 1944 with Invasion Stripes
 AMD48107 Me 262A (6) 110956 111EJ2; Green 3 Stab JG7; White 7 JV44; White 2 111JG7; DA Stab KG76; White B Kommando Schenk Various camos
 AMD48109 Fw-190D Reich Defence Part 6 (5) Black 10 IIJG26 black white tail band; White 1 JG6 red white tail band; White JG 2 yellow white tail band; Black 4 IIJG6; Black 12 IIJG6

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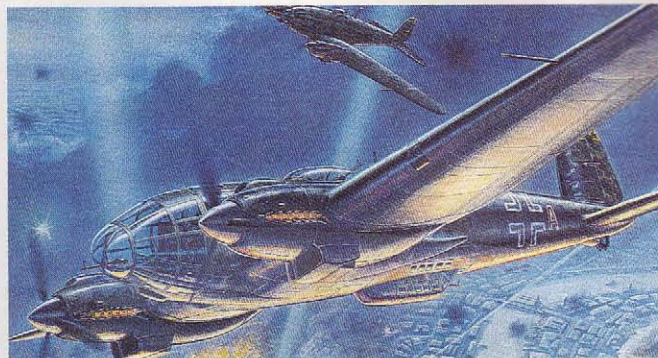
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SUBSCRIPTION RATES (for 12 issues)

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Welcome to the first
issue of a new maga-
zine for everyone
interested in aviation model-
ling: *Scale Aviation Modeller*.

Although the appearance of
this first issue is a matter of
great pride for all at Concept
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Scale Aviation Modeller is
tinged with sadness for the
editorial team, as it has been
marred by the tragic early
death of Mike Keep, whose
brainchild it was and who's
high standards we hope to live
up to.

Future features planned for
Scale Aviation Modeller will
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niques and product surveys.
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our aim to cater for all tastes
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As the editor of this new
title, I am concerned to provide
what the modeller wants. If
you have any ideas or com-
ments on *Scale Aviation
Modeller*, please write to me at
the editorial address given in
the masthead on the left. In the
meantime, thank you for pur-
chasing *Scale Aviation
Modeller* and I hope that it will
quickly become an indispensi-
ble reference in your library.

Sue Bushell
Editor

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Mike Keep – An Appreciation

An era in scale aeronautical publishing has ended with the sudden and tragically early death of Mike Keep.

One of this country's best known aviation draughtsmen, he was famous with aeromodellers the world over for his astonishing monthly output of scale drawings which have been enjoyed by so many of them for the last sixteen years. His approach to his craft was impressive, for he was never content to simply take existing drawings at face value, but wherever possible worked direct from dimensions taken from the actual prototype by himself. The writer has fond memories of Mike teetering precariously on a ladder as he measured the newly arrived Pucara at Yeovilton.

Evolving from his early days as a draughtsman with Hunting Percival and, later, Westland, Mike's methodical and meticulous style was made to look deceptively easy by the speed with which he worked. To watch him at work was a revelation – minor miracles of precision penmanship were turned out on a glass-topped dining room table with the aid of an archaic wooden drawing board and T-square, while the television, the dog and the rest of his domestic surroundings swirled around him at a high level of decibels. To all of this Mike was oblivious!

Although his best known works are the tone drawings, aimed specifically at modellers, of just about anything that ever flew, he was also responsible for many of the accurate drawings in that aeronautical bible, Janes. There can surely be no finer acknowledgement of his skill than that. Yet, he was also a highly capable colour artist, an ability he was rarely given an opportunity to use. Lately, this had become a source of some frustration to him, and consequently he had been greatly looking forward to the new venture which had been offered to him, when he had hoped to develop a magazine carrying his own distinctive style. Sadly, it was not to be, for in one of those ironies of fate he was struck down by a massive heart attack just as he was about to embark upon the first edition. He is survived by his wife, Janet, also once a co-worker at Hunting, and his son and daughter.

It's difficult to believe that he will never again ring up late at night asking 'What have you got on the Bloggshall X-49 Mk 2?', but his legacy in the form of thousands of accurate reference drawings lives on as a guide, inspiration and pleasure to those who follow.

Barry Ketley

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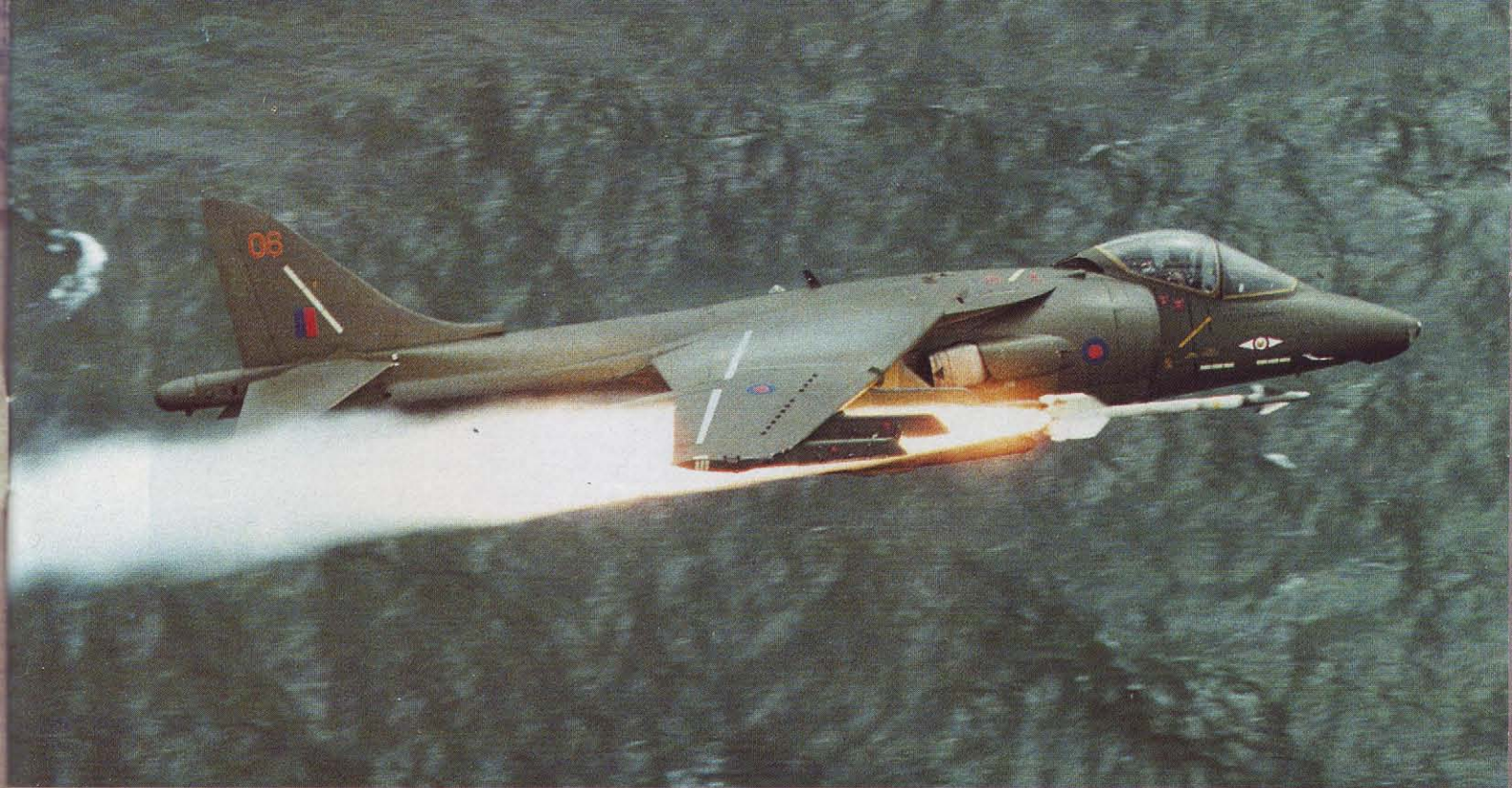
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A photograph of two Harrier II jets in flight over a desert. The jet in the foreground is viewed from a high angle, showing its underside and the cockpit. It has several missiles mounted under its wings. The jet in the background is viewed from a side-on perspective. The desert landscape below is arid and rocky.

INTO FOCUS – HARRIER II

A quarter of a century after its entry into service, the Harrier remains one of the most potent weapons in the modern armoury. Its vertical take-off and landing capabilities and thus its ability to operate in the most primitive conditions have yet to be equalled. *Sue J Bushell* chronicles the second-generation Harrier II.



The Harrier can trace its lineage back to August 1957, when the first vertical take-off proposal from Hawker Aircraft left the drawing boards at the company's Kingston-upon-Thames works. This proposal eventually metamorphosed into the P.1127, powered by a Bristol Pegasus engine of 11,000 lb st, which made its first tethered hover at Dunsfold on 21 October 1960, followed by free flight on 19 November. Following manufacturer's trials, the prototype P.1127 was handed over to the Royal Aircraft Establishment at Bedford where it was later joined by five other development aircraft.

NATO's desire for a VTOL combat aircraft in the early 1960s led to the P.1127 being chosen as a potential solution and joint research by Britain and West Germany began as early as January 1961. In 1963 funding was announced for nine examples of the P.1127, to be known in service as the Kestrel FGA.1. These were delivered to the Kestrel Evaluation Squadron from mid-1964 onwards – the unit had been formed by the Royal Air Force, Luftwaffe, US Air Force, US Navy and US Army. Trials were completed by the end of 1965, when the eight surviving aircraft were distributed between

the participating air arms. The US military took four aircraft plus the two allocated to (but not required by) West Germany and continued evaluation with the USAF, USN and NASA under the designation XV-6A. The RAF took the remaining two aircraft.

RAF interest in the Kestrel led to the announcement of the P.1154 Harrier. However, the P.1154 was cancelled in February 1965 before an aircraft could be completed. Less than three weeks later, the Ministry of Defence issued a contract for six pre-production examples of the militarised P.1127 (actually aircraft originally announced in February 1963 as part of the Kestrel order but not built at that time).

The resulting Harrier was a more powerful version of the Kestrel, fitted with a Pegasus 6 engine of 19,000 lb st and retaining the more advanced avionics fit of the P.1154. The first aircraft, serialised XV276, made its first flight (with its predecessor's Pegasus 5 engine) on 31 August 1966. The balance of the order followed over the next 12 months with the aircraft either being retained by the manufacturer or passed to the A&AEE at Boscombe Down for trials. The first production order for 60 Harrier GR.1s was placed on 28 December 1967 and later

A Harrier GR.5 of No.1 Squadron unleashes a Sidewinder during trials. (British Aerospace)

orders for another 58 were placed over the next fifteen years, bringing Harrier GR.1 production to 118 production and six prototype aircraft.

The Harrier entered RAF service in 1969 with No.1 Squadron and No.233 Operational Conversion Unit (OCU) at Wittering, followed by Nos 3, 4 and 20 Squadrons at Wildenrath in West Germany. Twenty-seven two-seat Harrier T.2s were also produced, with the prototype T.2's first flight taking place on 24 April 1969. Further improvements were made to the Harrier during its service career, resulting in the Harrier GR.3, which featured an uprated Pegasus 11 (Mk.103) engine of 21,500 lb st and improved radar and laser equipment.

The first overseas customer for the Harrier was the US Marine Corps, which initially ordered 12 aircraft on 23 December 1969. The first of these, BuA 158384 was first flown on 20 November 1970 and deliveries began early the following year. By the time the last aircraft was delivered in November 1976, the USMC had received 102 single-seat and eight two-seat AV-8As.



Above: The old and the new: A Harrier GR.3 of No.4 Squadron formates upon the squadron's GR.7s. (British Aerospace) Below: The second prototype YAV-8B, BuA 158395, in flight. (McDonnell Douglas)



New 'Improved' Harrier

The Harrier had scarcely entered service when Hawker Siddeley and McDonnell Douglas began work on an improved airframe, concurrently with a Rolls-Royce and Pratt & Whitney collaboration to produce a more powerful engine. Initial proposals centred around the P.1184 and P.1185 series with an aircraft initially designated as 'XV-16' – this was a standard Harrier fuselage fitted with super-

critical section wings. Initial US Navy interest in the project diminished when that service opted for Rockwell's XTV-12A in 1972, and although work on the improved Harrier continued, little was achieved before the British government withdrew its support in March 1975.

McDonnell Douglas persevered with the project, mainly by proposing refinements that would improve the aircraft whilst keeping

costs low. The US Marine Corps supported the aircraft and guided the design towards improved payload and range capability, principally by the use of lighter carbon-fibre materials. These improvements gave a marked improvement in the Harrier's capability, with the AV-8B carrying 70 per cent more internal armament and 50 per cent more internal fuel whilst retaining the same powerplant as the AV-8A. At the same time maintenance and ground equipment requirements were reduced.

The new wing was first flown on the 11th AV-8A on 9 November 1978 – this aircraft, BuA 158394, thus became the first of two YAV-8Bs. Its wingspan was 20 per cent longer than that of the first-generation Harrier and it featured 14.5 per cent more area. A reduction in sweep made the aircraft marginally slower than its forebear. Other changes to the AV-8B airframe included leading-edge root extensions and three weapon pylons beneath each wing. The outrigger wheels have been moved inboard to provide shorter wheel track and improve operations from narrow strips such as public roads. The pilot's cockpit was also redesigned for ease of use and repositioned 12 inches higher to improve visibility.

The AV-8B was first ordered on 12 April 1979 and the prototype, BuA 161369 made its maiden flight on 5 November 1981. The first AV-8B was eventually delivered to the USMC in January 1984 with VMAT-203 being the initial operator of the new type. USMC procurement, initially set at 342 aircraft, was down to 328 by 1990.

Early Harrier IIs used the Pegasus 11-21 or F402-RR-406/406A powerplant; a double row of pressure-relief doors was fitted to the first 16 AV-8Bs, which

Harrier II Specification:

Wing Span	30 ft 4 in (9.25m)	Maximum take-off weight	31,000lb (14,061kg)
Length (AV-8B)	46ft 4in (14.12m)	Maximum speed (clean)	661mph (1065 km/h)
(TAV-8B)	50ft 3in (15.32m)	Combat radius	103 miles (167km) with
Height	11ft 7.75in (3.55m)		1-hour loiter
Wing area	338.7 ft ² (11.8m ²)	Maximum rate of climb	14,715ft/min
Empty weight (AV-8B)	13,086lb (5936kg)		(4485m/min)
(TAV-8B)	14,223lb (6451kg)		



also featured the F402-RR-404. Development of the improved Pegasus 11-61 began in 1983 and following successful tests, the first airborne trials began in June 1989 using GR.5 ZD402. The new engine provides an increased fan pressure ratio, improved cooling and improved reliability. Maintenance overhaul interval has also been raised, to 1,000 hours.

The AV-8B Harrier II is able to launch precision-attack missiles such as the AGM-65 Maverick in addition to AIM-9 Sidewinders, cluster bombs, rockets and conventional iron bombs. Its six underwing pylons will carry over 7,200 lb of armament, with a further 1,000 lb on the centreline station. The ADEN cannon so beloved by the RAF is not carried by the USMC examples, which have a single 25mm General Electric GAU-12/A in the port underfuselage pod – the starboard pod carries 300 rounds of ammunition.

Night Attack

McDonnell Douglas began looking at a night-attack version of the AV-8B in 1984 and BuA 162966 was converted for trials purposes, making its first flight on 26 June 1987, after which it was passed to VX-5 'Vampires' at China Lake,

California for trials. The aircraft features a GEC forward-looking infra-red sensor mounted above the nose and is capable of operation in darkness during clement weather conditions. From 15 September 1989 all aircraft delivered to the USMC were of this version, the first unit to receive the type being VMA-214 'Black Sheep' at Yuma, Arizona.

Third Generation

The Harrier II Plus programme was announced in 1987 and continues today. Harrier II Plus is some 2ft 5in longer than the AV-8B by virtue of the Hughes AN/APG-65 pulse-Doppler radar (also utilised by the F-18 Hornet) and is able to launch beyond-visual range missiles such as the Hughes AIM-120 AMRAAM and McDonnell Douglas AGM-84 Harpoon. Joined by Spain (which later withdrew from the radar upgrade in 1992 due to defence cuts) and Italy, the USA officially launched the programme in September 1990. Following a first flight on 22 September 1992, first deliveries to the US Marine Corps began on 18 April 1993 with the arrival at Yuma of BuA 164542. The first order was for 27 aircraft previously intended for the Night Attack

Above: A pair of Night-Attack AV-8Bs from VMA-542 'Flying Tigers' based at Cherry Point, North Carolina. (McDonnell Douglas)

role. Subject to funds being made available, a further 48 were due to be ordered while another 192 existing airframes were also due to be converted.

Harrier GR.5

Having pulled out of the Harrier II programme in 1975, it was not until 1982 that British Aerospace was able to return to the programme, fulfilling the RAF requirement of AST 409 for a V/STOL replacement aircraft. The Memorandum of Understanding gave the British company 40 per cent of airframe work (50 per cent on RAF aircraft) and 25 per cent of sales to third parties. Simultaneously, Rolls-Royce concluded its agreement with Pratt & Whitney which gave the former 75 per cent of all Pegasus work on Harriers. RAF Harrier GR.5s were powered by the Pegasus Mk.105 of 21,750 lb st. Differences between RAF and USMC Harrier IIs include the replacement of the Litton AN/ALR-67 RWR with the Marconi Zeus version while the

RAF aircraft can use outrigger fairing extensions to launch Sidewinders, a feature not fitted to USMC examples which have to use one of the underwing points. From 1993, No.1 Squadron added CRV-7 rockets to its inventory.

Initial orders for the Harrier GR.5 were placed in 1982 for two pre-production and 60 production aircraft. The first of these, ZD318, made its first flight from Dunsfold on 30 April 1985 and following trials the first aircraft to be delivered to the RAF (ZD325) arrived at Wittering on 29 May 1987 for engineering familiarisation. Problems with the aircraft's inertial navigation systems and the Martin-Baker Mk.12 ejection seat resulted in delays before operational service commenced, but No.233 OCU finally started training pilots on 18 July 1988 and No.1 Squadron, which had operated Harriers since mid-1969, was finally declared operational with the GR.5 on 2 November 1989. Deliveries were then concentrated on No.3 Squadron at Gütersloh – its first GR.5 was delivered on 7 December 1988 and re-equipment had been completed by April 1990.

Harrier GR.7

Further orders followed in 1988 with the announcement of 34 night-capable GR.7 aircraft and plans to update the Harrier GR.5 survivors (58 aircraft – one was lost prior to delivery and another two in service) to this standard were confirmed by

Harrier II serials:

RAF:

Harrier GR.5 ZD318-330, ZD345-355, ZD375-380, ZD400-412

Harrier GR.5A ZD430-438, ZD461-470

Harrier GR.7 ZG471-480, ZG500-512, ZG530-533, ZG856-862

Harrier T.10 ZH653-ZH665

USMC:

YAV-8B: 158394, 158395

AV-8B/TAV-8B: 161396-161399; 161573-161584; 162068-162088; 162721-162747; 162942-162973; 163176-163207; 163419-163426; 163514-163519; 163659-163690; 163852-163883; 164113-164154; 164540-164571; production continues

(28 TAV-8Bs are interspersed within the AV-8B blocks listed above: these include 162747, 162963, 162971, 163180, 163186, 163191, 163196, 163202, 163207, 163856-163861, 164113-164114, 164122.

Spain:

EAV-8B: VA.2-1 to VA.2-12

Italy:

TAV-8B: MM55032-MM55033

AV-8B: MM7199; production continues

a contract issued on 2 November 1989. As an interim measure, the last 19 aircraft of the order were built to GR.5A standard with some of the GR.7 work, particularly in the avionics fittings, already completed. These were then placed in storage until conversion could be started in 1990. The prototype GR.7 was ZD318, which first flew as such on 29 November 1989. Most noticeable difference between the GR.5 and GR.7 is the pronounced bump on top of the nose which was intended to house a Miniature Infra-Red LineScan system for all-weather reconnaissance. This programme was cancelled for financial reasons and the GR.7 lacked reconnaissance capability

until 1993, when the type was adapted to carry the Harrier GR.3's Vinten pod containing four F95 camera plus one F135. The bump presently houses the GEC Forward-Looking Infra-Red (FLIR) Sensor. A hitch in the programme came on 29 July 1991 when the fleet was grounded pending investigations into in-flight fires – ZG473 of No.3 Squadron had been lost on 29 May and a further two aircraft suffered similar problems, although both managed to land safely. The cause was identified as chafing by wiring in the rear fuselage and rectification saw the fleet return to the air on 16 September. Further modifications include LERX (Leading-Edge Root Extensions) to improve turning performance.

The first GR.7s to reach front-line service were delivered to No.4 Squadron at Gütersloh in September 1990; operations with the last of the earlier generation Harrier GR.3s with which the squadron was formerly equipped being completed on 7 December of that year. Next to re-equip with the GR.7 was No.3 Squadron which began exchanging its GR.5s in January 1991; No.1 Squadron followed suit in June 1992, by which

GR.5s ZD355/01 and ZD400/02 of No.1 Squadron in temporary winter camouflage for exercises in Norway. (British Aerospace)



time No.3 Squadron was performing the GR.7's first field deployment – to Sennelager as part of Exercise *Hill Foil*. Three months later, six Harrier GR.7s drawn from the German-based squadrons, accompanied by six Tornado F.3s and supported by VC10 tankers, deployed to Kuantan in Malaysia as part of the Five Power Defence Arrangement.

Current Harrier II operations are conducted by Nos.1 and 20 (Reserve) Squadrons at Wittering, the latter being formerly known as No.233 OCU, and with Nos.3 and 4 Squadrons at Laarbruch in Germany, these units having moved from Gütersloh in November 1992. A further RAF unit flying the new-generation Harrier is the Strike/Attack Operational Evaluation Unit at Boscombe Down which, as its name suggests, is involved in tactical evaluations – its first GR.7 was delivered on 17 August 1990, having originally received a GR.5 in July 1988. SAOEU was also the first RAF unit to fly a night mission – on 11 December 1990. From April 1993 the RAF has deployed Harrier GR.7s to Incirlik in support of Operation *Provide Comfort*, the no-fly zone over northern Iraq – personnel from all three operational squadrons provide crews on a rotational basis.

Twin-seaters

Initial pilot training for the Harrier

GR.5 was carried out using the earlier-generation T.4, with the general intention being to retrofit these aircraft with night-attack avionics and re-designating them as T.6s. On 28 February 1990, however, British Aerospace announced a contract to produce 14 Harrier T.10s, based on the USMC TAV-8B, later 're-announced' in February 1992 as 13 aircraft. The T.10 (the prototype of which, ZH563, first flew from Warton on 7 April 1994) has identical characteristics to the GR.7 and will be fully operational with armament capability when they enter service during 1995.

US Marine Corps

The USMC had received its first AV-8As in January 1971 and the first squadron, VMA-513 'Flying Nightmares', had been declared operational in April of that year, followed by three other squadrons. In preparation for the arrival of the AV-8B, 47 AV-8As were converted to AV-8C standard to bridge the gap, and the first AV-8Bs were delivered to VMAT-203 'Hawks' at Cherry Point, North Carolina in December 1983 to begin pilot training – the official handover of the first aircraft, 161573/KD-21 took place on 12 January 1984. Two-seat TAV-8Bs began arriving from 1987 onwards and the first-generation AV-8s were finally retired from November 1987. VMA-214 was

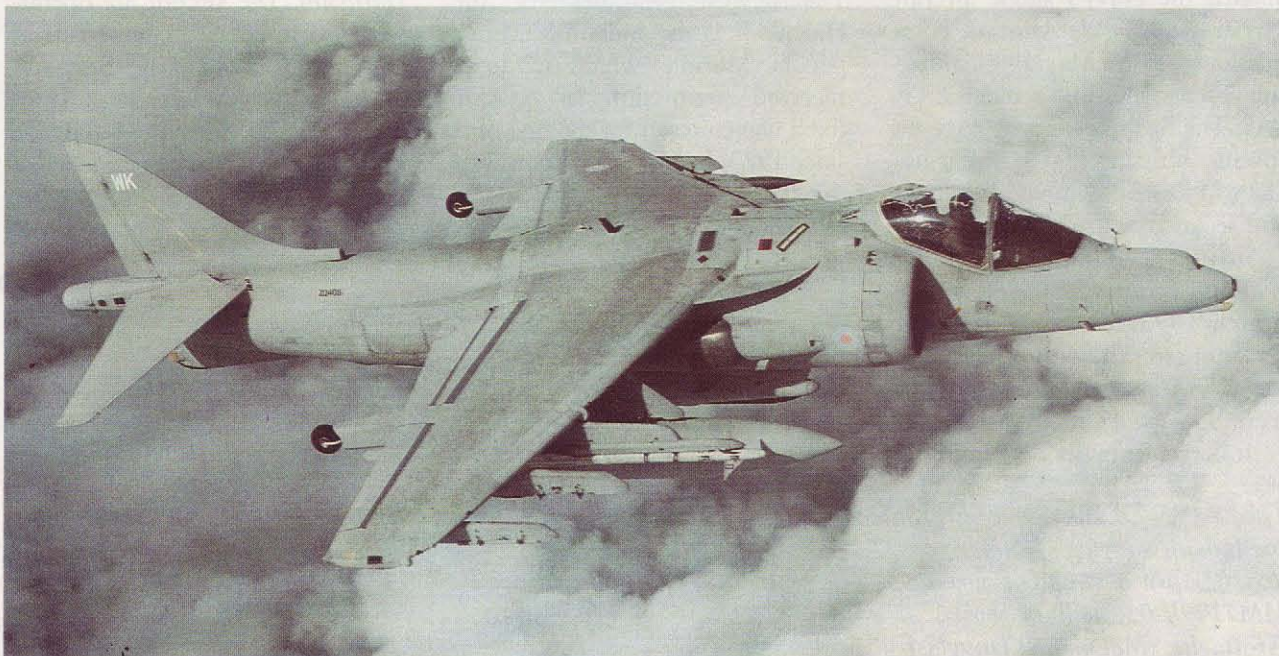
the first US Marine Corps unit to receive the Harrier Night-Attack version, which replaced the unit's A-4M Skyhawks.

Current operators of the AV-8B are Marine Air Group 13 based at Yuma, Arizona – its constituent squadrons are VMA-211 'Wake Island Avengers', VMA-214 'Black Sheep', VMA-311 'Bulldogs' and VMA-513 'Flying Nightmares' (the latter two being equipped with Night-Attack AV-8Bs); and Marine Air Group 32 at Cherry Point, North Carolina: VMAT-203 'Hawks', VMAT-223 'Tomcats', VMA-231 'Aces', and VMA-542 'Flying Tigers'. One squadron is usually deployed to Iwakuni, Japan as part of the 1st Marine Air Wing on a rotational basis, whilst some aircraft with the other squadrons are frequently embarked aboard various assault vessels.

The USMC Harriers played a major part in Operation *Desert Storm*, with aircraft from five squadrons – four based at King Abdul Aziz Air Base and one aboard the *USS Nassau* – playing their part. Losses comprised five aircraft in combat, all shot down by ground fire, plus another in an accident from 86 aircraft deployed.

At the same time as the Gulf

Below: GR.7 ZD408/WK carries the grey colour scheme adopted for operations in Bosnia. (British Aerospace)



War build-up, two AV-8Bs of VMA-223 were in action over Africa. Flying from *USS Saipan*, on 5 August 1990 they flew top cover as part of Operation *Sharp Edge*, the rescue of American citizens from Liberia. In December 1992, the Marine Corps was back in Africa, this time on the other side of the continent. VMA-211 from Yuma provided five aircraft, operating from *USS Tripoli*, as part of Operation *Restore Comfort* in Somalia. Recently, AV-8Bs from *USS Saipan* have participated in Operation *Deny Flight*, the no-fly zone over the former Yugoslavia, assisted by Italian Navy examples and Royal Navy Sea Harriers.

Other AV-8Bs are operated by the Naval Air Weapons Centers at Patuxent River and China Lake.

Spain

Having operated the AV-8A Matador since July 1973, the Spanish Arma Aérea de la Armada was an obvious candidate for the second-generation AV-8B, and it placed a contract for a dozen EAV-8B Matador IIs. The first three aircraft were delivered in August 1987 and following pilot conversion training, were delivered non-stop from St Louis to Rota on 6 October 1987, where they joined Escuadrilla 009; the unit had formed the previous week. All twelve were delivered by September 1988 and are used aboard the Navy's single aircraft carrier, *Principe de Asturias*, commissioned on 31 May 1989, alongside Escuadrilla 008's older EAV-8As. The Spanish aircraft have no specific anti-ship weapons but use Sidewinders for combat air patrols and secondary air defence.

Spain is involved in the Harrier II Plus programme and on 8 March 1993 confirmed an order for eight aircraft, with deliveries of the CASA-assembled aircraft due from 1996 – as many as 30 aircraft may eventually be required if

The first AV-8B Harrier II Plus for the Italian Navy was handed over on 20 April 1994. The aircraft, MM7199/I-03, will be based at Grottaglie. (McDonnell Douglas)

SELECTED AV-8B/HARRIER II KITS:

1:48th	Monogram	AV-8B
	Revell	AV-8B
1:72nd	Airfix	Harrier GR.5; Harrier GR.7; Harrier T.10
	Airfix 'Hi-Tech'	Harrier GR.7
	Humbrol/Heller	TAV-8B
	Italeri	TAV-8B, Harrier GR.5, AV-8B Night-Attack
1:144th	Dragon Models	AV-8B

DECALS:

1:72nd:

Fineline	2001	Harrier GR.5 ZD402 special c/s
Modeldecals	MD115	Harrier GR.7 20 (R) Sqn
Superscale	72-584	AV-8B: VMA-223, VMA-311, VMA-331
	72-585	AV-8B: VMA-321, VX-5, VMA-331
	72-586	AV-8B: Stencil data for one aircraft
	72-625	AV-8B: VMAT-203, VMA-231, VMAT-214, VMAT-211
Xtradecal	X012-72	Harrier GR.5 1 Sqn

1:48th:

Fineline	8001	Harrier GR.5 ZD402 special c/s
Superscale	48-352	AV-8B: VMA-223, VMA-311, VMA-331
	48-353	AV-8B: VMA-321, VX-5, VMA-331
	48-354	AV-8B: Stencil data for one aircraft
	48-410	AV-8B: VMAT-203, VMA-231, VMAT-214, VMAT-211

Please note that these lists are not exhaustive

plans to purchase a second aircraft carrier are completed. At the same time a TAV-8B was ordered to complement the older TAV-8As already in service and plans were also announced to upgrade 11 surviving EAV-8Bs to the Harrier II Plus standard. The Royal Thai Navy is reported to be interested to purchasing the older-generation Harriers when they are replaced – its aircraft carrier is currently being built in Spain.

Italy

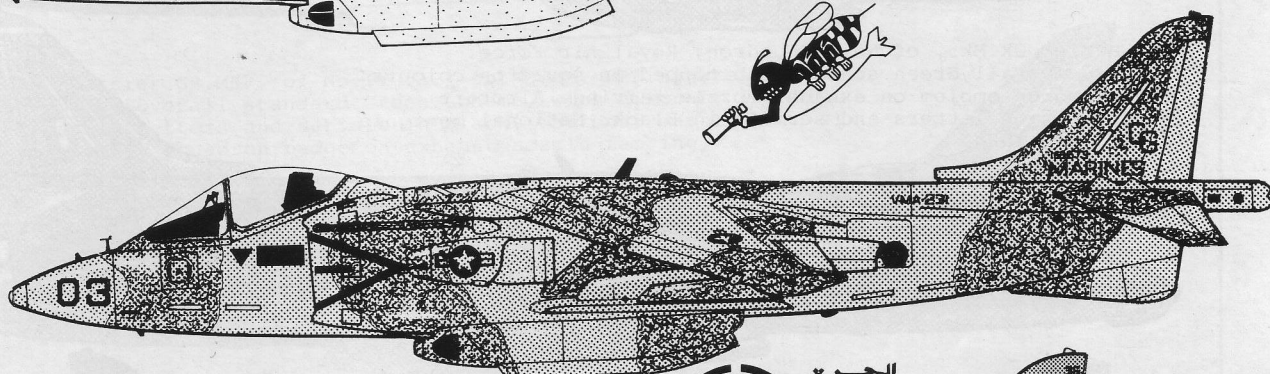
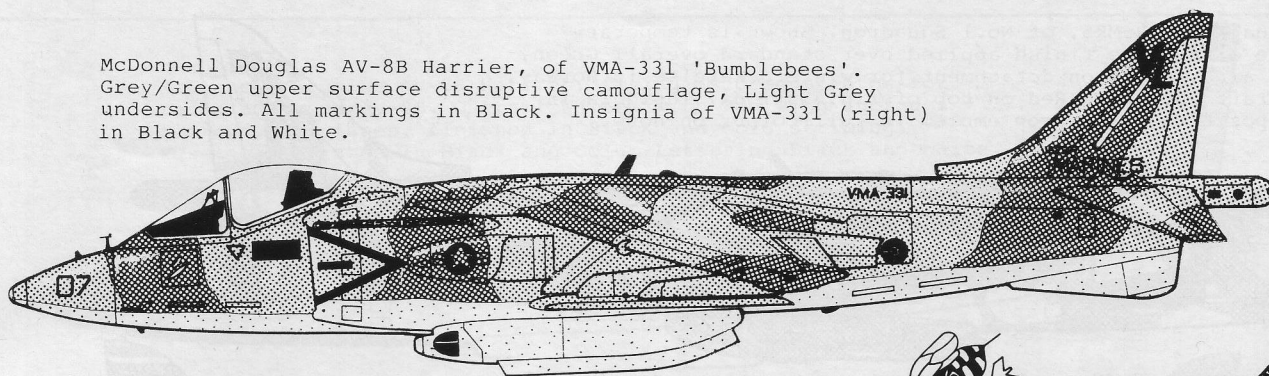
The newest customer for the Harrier II is the Italian Aviazione per la Marina, which in 1989 received permission to operate fixed-wing aircraft for the first time since 1923. In May 1989 it ordered two TAV-8Bs. The AV-8B was cho-

sen in preference to the Sea Harrier and an initial order for three AV-8B Harrier II Plus aircraft and additional spare engines was placed in July 1991, with notification of an order for 13 aircraft being made on 18 November 1992 – these aircraft, assembled by Alenia, are due for delivery from late 1995 onward. Eight options are also held.

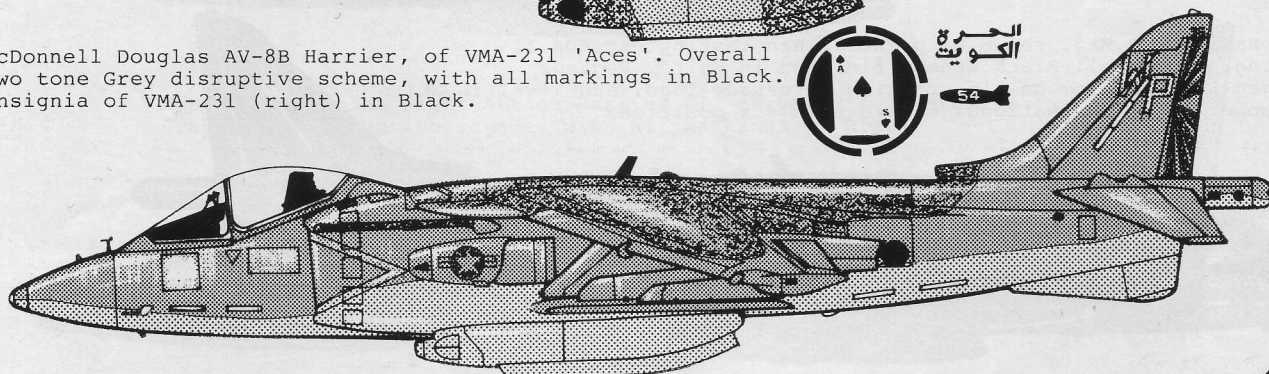
Delivery of the TAV-8Bs came on 23 August 1991 when the aircraft, serialised BuA MM55032/I-01 and MM55033/I-02, were handed over aboard the Italian carrier *Guiseppe Garibaldi*. The aircraft are operated by Gruppo Aerei Imbarcati at Taranto/Grottaglie. The first AV-8B, serialised MM7199, was handed over on 20 April 1994 and was dispatched to Cherry Point to assist in pilot training.



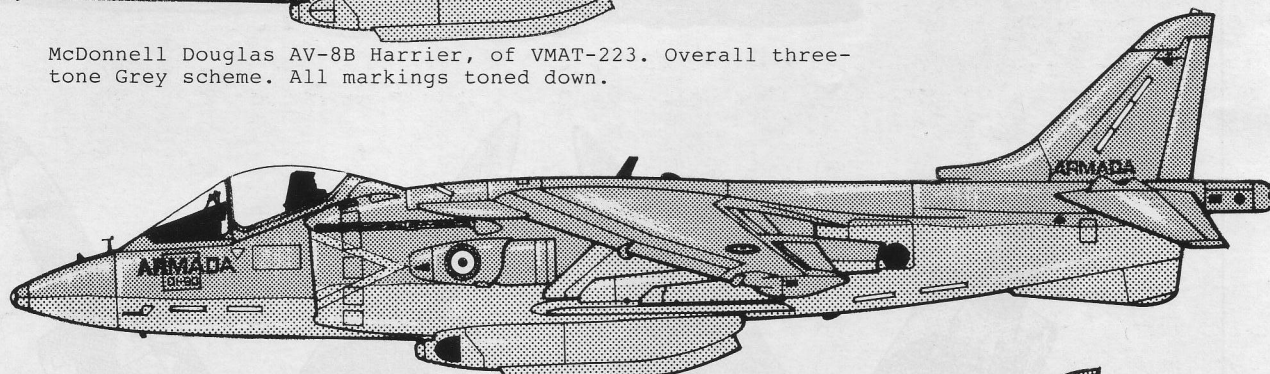
McDonnell Douglas AV-8B Harrier, of VMA-331 'Bumblebees'. Grey/Green upper surface disruptive camouflage, Light Grey undersides. All markings in Black. Insignia of VMA-331 (right) in Black and White.



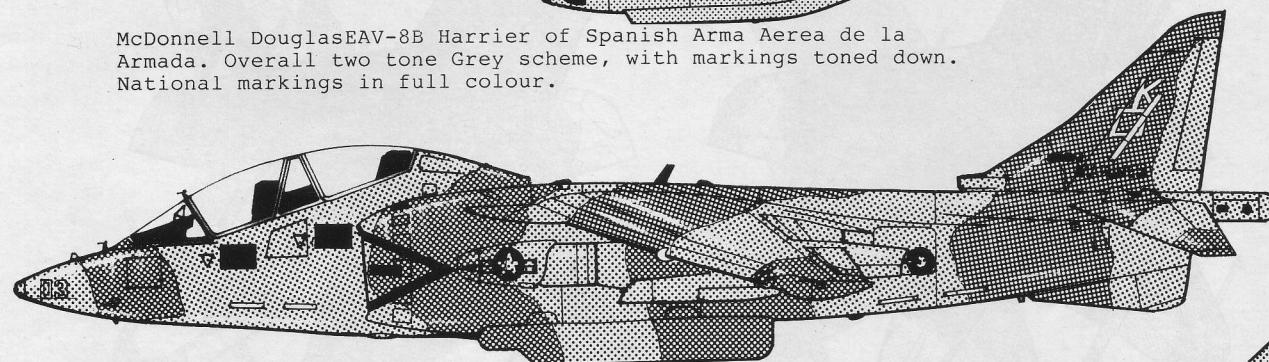
McDonnell Douglas AV-8B Harrier, of VMA-231 'Aces'. Overall two tone Grey disruptive scheme, with all markings in Black. Insignia of VMA-231 (right) in Black.



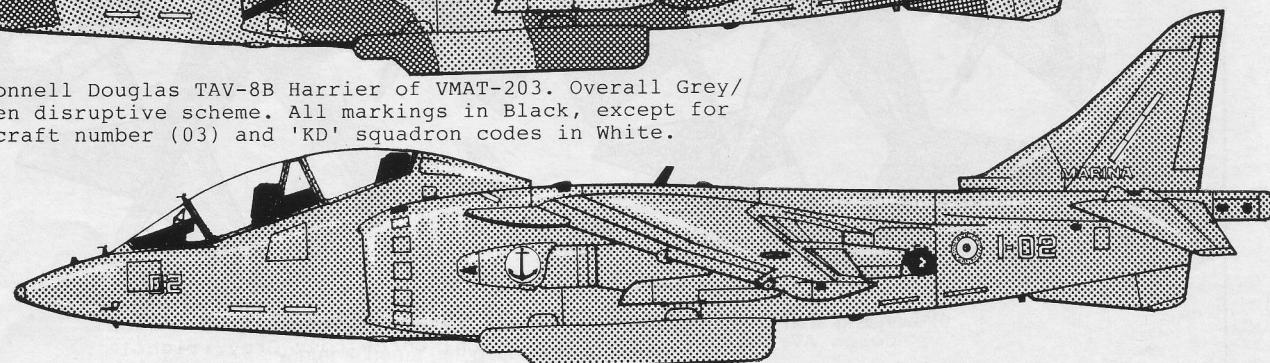
McDonnell Douglas AV-8B Harrier, of VMAT-223. Overall three-tone Grey scheme. All markings toned down.



McDonnell Douglas EAV-8B Harrier of Spanish Armada. Overall two tone Grey scheme, with markings toned down. National markings in full colour.

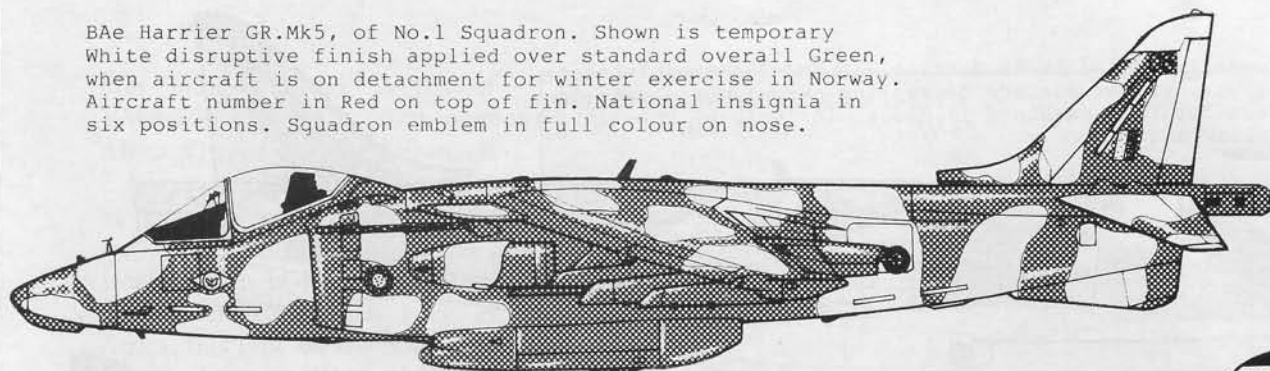


McDonnell Douglas TAV-8B Harrier of VMAT-203. Overall Grey/Green disruptive scheme. All markings in Black, except for aircraft number (03) and 'KD' squadron codes in White.

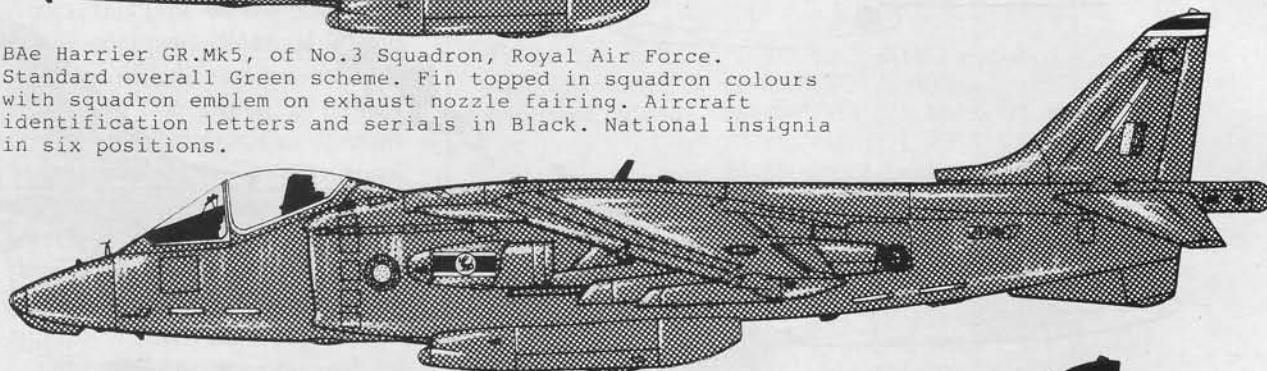


McDonnell Douglas TAV-8B Harrier, operating from the Italian carrier, 'Giuseppe Garibaldi'. Overall Grey scheme, with all lettering and numbering in White. National markings in full colour.

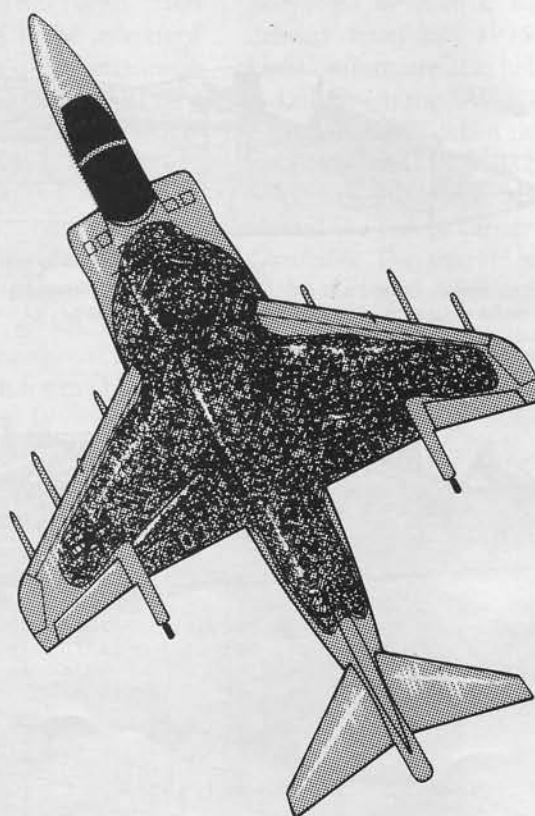
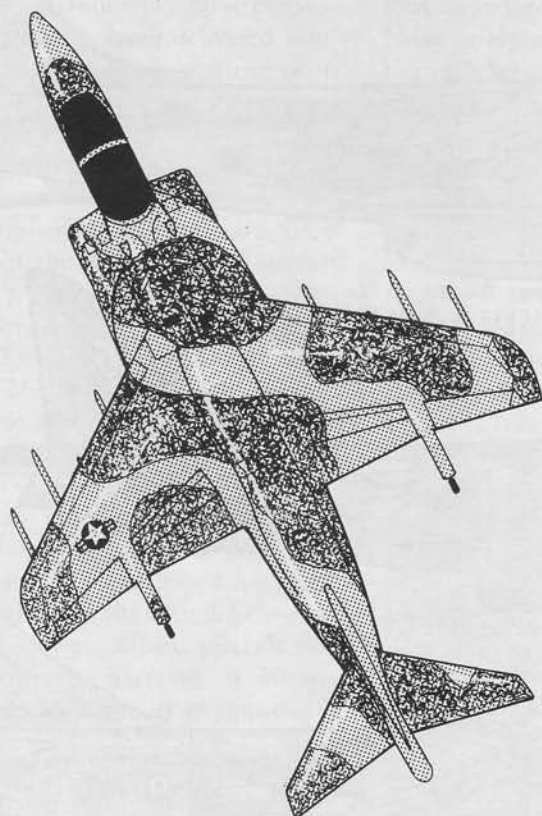
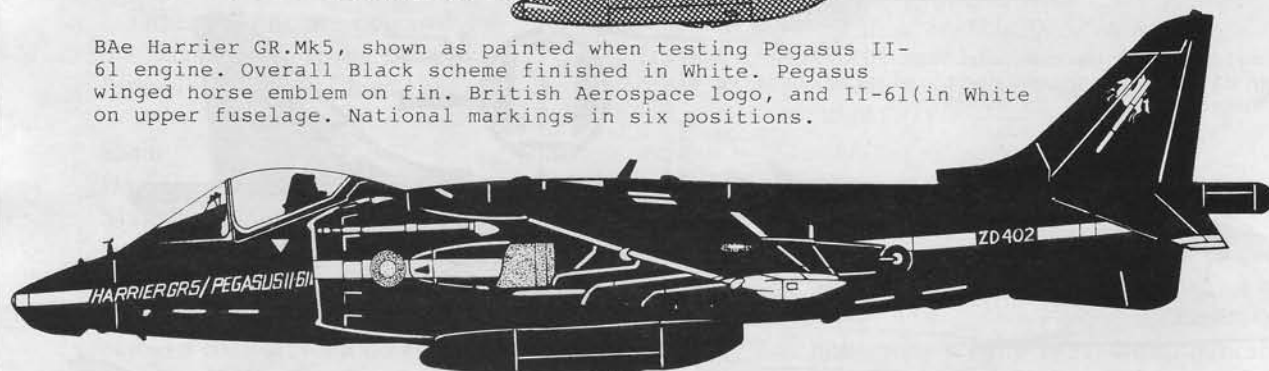
BAe Harrier GR.Mk5, of No.1 Squadron. Shown is temporary White disruptive finish applied over standard overall Green, when aircraft is on detachment for winter exercise in Norway. Aircraft number in Red on top of fin. National insignia in six positions. Squadron emblem in full colour on nose.



BAe Harrier GR.Mk5, of No.3 Squadron, Royal Air Force. Standard overall Green scheme. Fin topped in squadron colours with squadron emblem on exhaust nozzle fairing. Aircraft identification letters and serials in Black. National insignia in six positions.

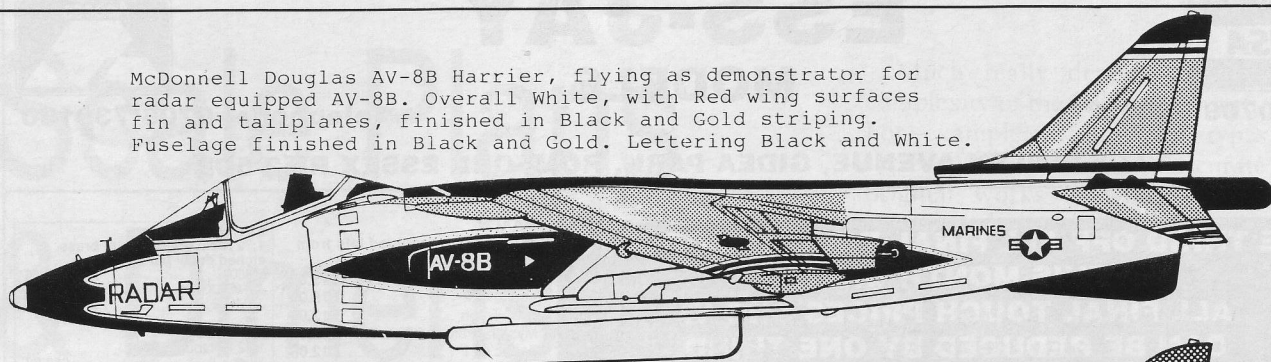


BAe Harrier GR.Mk5, shown as painted when testing Pegasus II-61 engine. Overall Black scheme finished in White. Pegasus winged horse emblem on fin. British Aerospace logo, and II-61 (in White) on upper fuselage. National markings in six positions.

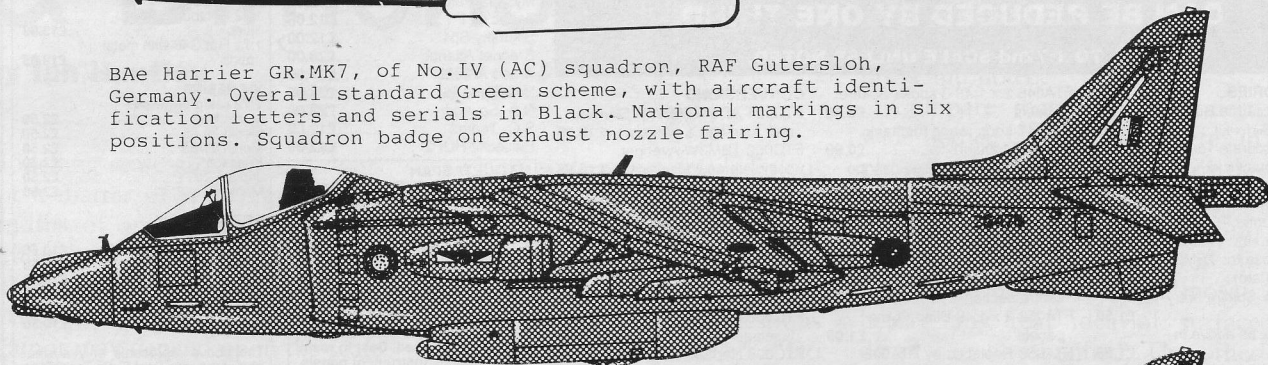


10. Upper surface views showing disruptive schemes of US Marine Corps AV-8Bs. Two tone Grey (left) three tone Grey (right)

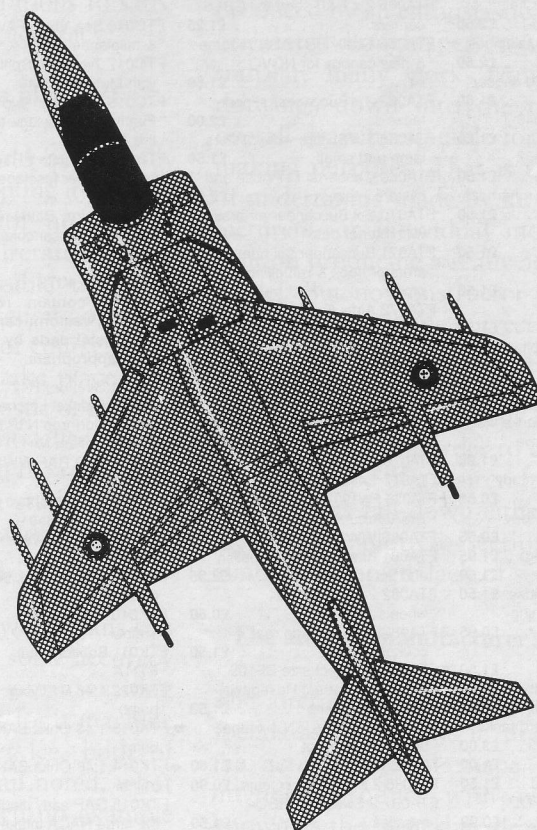
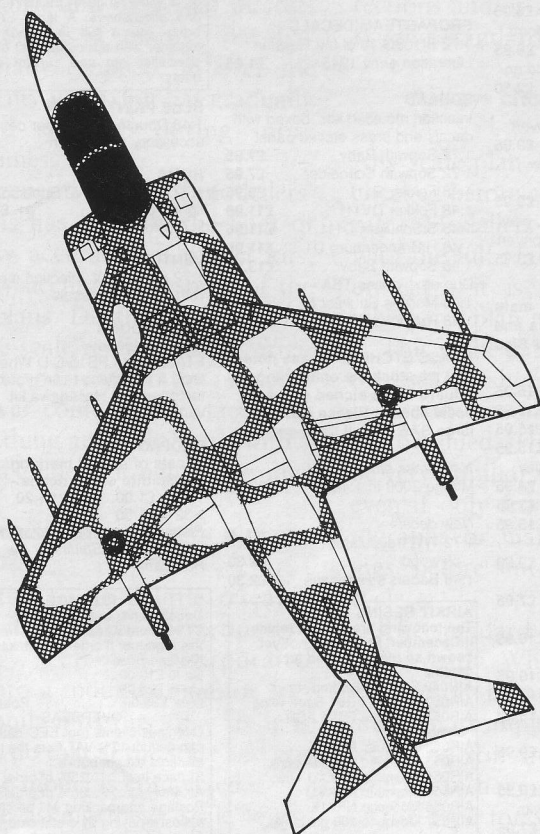
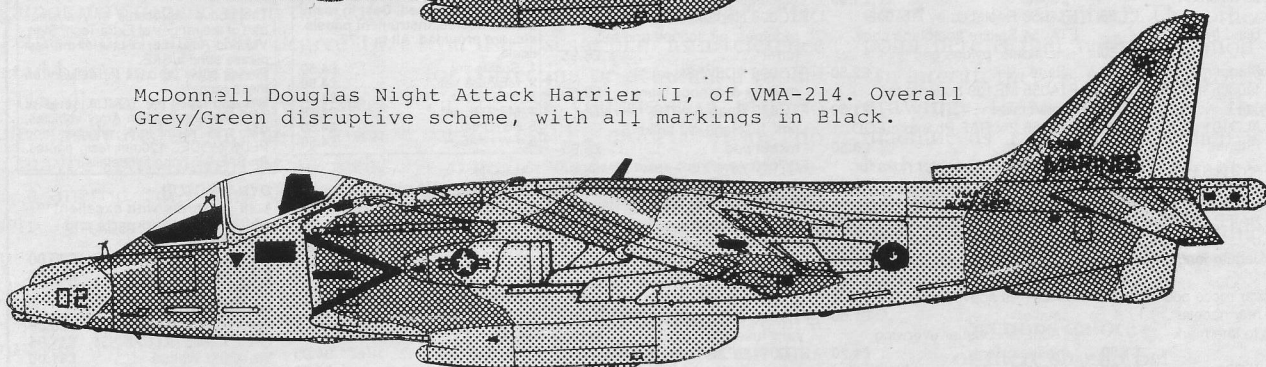
McDonnell Douglas AV-8B Harrier, flying as demonstrator for radar equipped AV-8B. Overall White, with Red wing surfaces fin and tailplanes, finished in Black and Gold striping. Fuselage finished in Black and Gold. Lettering Black and White.



BAe Harrier GR.MK7, of No.IV (AC) squadron, RAF Gutersloh, Germany. Overall standard Green scheme, with aircraft identification letters and serials in Black. National markings in six positions. Squadron badge on exhaust nozzle fairing.



McDonnell Douglas Night Attack Harrier II, of VMA-214. Overall Grey/Green disruptive scheme, with all markings in Black.



Upper surface views showing schemes of RAF Harriers green/white winter scheme (left) overall green scheme (right).



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FTA011 1 x ALO101 pod	£1.50
FTA012 1 x Phlamm dispenser	£1.50
FTA013 2 x Hindenburg Tornado fuel tanks	£2.95
FTA014 1 x RAF Pave Spike pod	£1.50
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FTA017 2 x rear nacelle extensions to late mark	£1.50
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FTA037 APS20 radome	£1.50
FTA038 Canberra TLL nose	£1.50
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FTA041 2 x 1:48 Hindenberger tanks for Itali Tornado	£3.95
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FTA043 1 x Tiald pod	£1.00
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FTA046 2 x 1:48 3 spoke Spitfire wheels	£0.50
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FTA060 10 injection moulded spinners to replace those in vac forms	£1.00
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All kits contain resin main sections, vacform canopies and white metal parts by Lead Sled where appropriate.	
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FTK005 1:32 RAF WW2 Trolley Accumulator	£4.95
FTK006 1:48 as above	£3.95
FTK007 Fairey Battle	£15.95
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S.O. Triton	£12.00
Mystere/Falcon 20	£15.00
Leduc 021	£12.00
Sikorsky S51	£12.00
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Arado Ar232B	£27.00
B45 Tornado	£23.00
N.A. Savage	£23.00
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2. F106B two seater	£9.99
3. Mirage 111D two seater	£9.99
4. WC130F Hercules conv.	£5.99
5. Grumman Tracer conv.	£11.99
6. Grumman Greyhound conv.	£11.99
7. Martin Baker MB5 kit	£11.99
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4. ME109E set	£4.50
5. P51D set	£4.50
6. FW190 SET	£4.50

FALCON

Clear Vax 2: Luftwaffe part 4 inc. DQ335, JU88A, Bf110G, Fw189, HE111, Bf108, ME1101, ME163A, S1204	
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Westland Wyvern	£5.95
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AIR050 Mosquit FBV1 Banff Wing
AIR051 Mosquit FBV1 ASH bomber
AIR052 Mosquit NFX11
AIR053 Mosquit NFX111 early
AIR054 Mosquit NFX111 late
AIR055 Mosquit NFXV11
AIR056 Mosquit NFX1X
AIR057 Mosquit 100 gal tanks.

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JUMO 213	£4.75

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Merlin 61-85	£2.50
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Please allow 28 days for delivery on these ranges.

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1:48 vacforms with excellent white metal/resin parts and superb decals	
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Westland Wvern	£25.00

ESOTERIC

Glen Martin MS1	£5.50
Great Lakes BG1/XB2G1	£11.95
Westland Walrus	£11.00
BD1 Destroyer	£16.50

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HUMA

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VENTURA

1:72 Seafire XV, injection moulded with Canadian decals	£9.95
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PROPAGTEAM

Sheets of stencil markings for the Spitfire or Hurricane:-	
1:72 = £1.00. 1:48 = £1.20	
1:32 = £1.50	
Please state if you require the sheets for the Spitfire or the Hurricane.	

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Scale Plans & Dimensions

by Ian Huntley

Modelling scale aircraft is perhaps not a matter of working to thousandths of an inch or millimetre, although a micrometer or other gauge might be used on wire or for checking the size of a drill, but again it may depend upon the scale of the model and the degree of detail being incorporated.

Usually we are dealing with steel rules graduated in anything down to maybe sixty-fourths of an inch, or a metric rule with half-millimetre graduations. But whatever our measuring criteria might be, everything really depends upon a scale or dimensioned working drawing with which to set out the size of the model.

Queries about the accuracy of scale plans, and of actual aircraft dimensions is a matter that has occasionally cropped up over the past twenty years, but has gradually gathered strength during more recent times.

The general theme of modellers' questions has been on the lines of just how accurate are model kits, and how accurate are some of the model plans. Do they really represent true scale replicas of the original, particularly when the modeller may never come face to face with the real thing and only work with a plan as a guide, is it right or wrong?

Don't trust either a kit or a plan

It is better to do a little research first so that simple corrections, if necessary, can be incorporated firstly into a modified plan or secondly, built into the kit – as it is better to do that at the start and not when the model is completed.

People asking these 'scale' questions vary from very experienced modellers who perhaps construct

very large scale, super-detailed models, to those less experienced but who have been modelling long enough to realise that accuracy plays a large part in a successful model.

In these cases there are questions that I usually ask of modellers. "Do you use a scale plan as a reference for correcting or detailing a model kit, or are you using a plan to scratch build a model?" Also, "do you make your own working drawings (perhaps based on a published plan) and detail it before commencing any model working?"

A further important question is "How much faith do you have in a published plan. Do you accept it as accurate or, having cast a critical eye over it, do you then make corrections and/or alterations to satisfy your standard of accuracy?"

Always check a plan first

Any scale plan should be carefully checked before accepting it as accurate. Modellers with no contact with the full scale aircraft ask how on earth it is possible to know whether a plan is accurate or not.

This is the catch of course. A lot of research should take place long before any wood, plastic or metal is cut or glued. The modeller should be very familiar with the real thing, even if only from a study of photographs or manufacturer's drawings, before starting the modelling cycle.

The standard between plans can vary greatly. Whilst some accuracy may result because of an existing museum example or for a machine which is still in service, both of which can have detail noted, what of the type for which no example survives? Can a true model result in that particular case?

Much really depends on the complexity of the full scale aircraft. For example, with WW1 types there often exists quite accurate original works drawings which, because of the simplicity of the basic structure and the fact that the overall size suited close-up photography which encompassed the whole machine in one plate, fine surface detail can be easily recognised and noted.

Compare that with a modern wide-bodied 'jumbo' jet where, in photographic terms, a view of the whole machine becomes a mere speck on the horizon and close-up photos need to be so profuse in number as to form a huge mosaic before any real idea of surface detail can be obtained. The other point here is that with most modern aircraft there is no single works drawing that encompass the machine as a whole and which is both an accurate general arrangement and shows sections and surface details that would be suitable for accurate model making.

Sections galore – or there should be!

Usually such a drawing has to be produced by an enthusiastic model-orientated draughtsperson who can translate many works component drawings down into the type of overall drawing suitable for model making purposes. That is the sort of undertaking made by kit manufacturers, or individual modellers bent on producing a really accurate model. But no constructor always get the overall shape correct!

It is essential that any plan or elevation be carefully drawn out and as many cross sections as possible be created in order to capture the true shape of an aircraft. Most model plans fall down either from incorrectly plotted sections, or almost a complete lack of sections.

The aircraft manufacturer's side

The aircraft manufacturer initially spends as much time in preparing the actual physical shape of the intended product with what is known as the 'waterline drawings'. These are very similar to the drawings of ships hulls made by their

easy to sketch out a small shape rather than draw out a large one. But in order to get a really accurate small scale plan one must start with a large, very carefully plotted out drawing which can portray all the various small changes in profile and section, by drawing in a fine line and then photographically reducing it down to a smaller scale. However to create the large drawing in the first instance, one must have plenty of manufacturers' dimensional data to hand.

Having plenty of these dimensions means that ordinates can be accurately plotted in a large scale, which is not so easy in a small one, where the thickness of a fine pencil or pen could, again, cover several inches full scale.

Try drawing a 'Spitfire' side elevation in 1:72 scale and compare it with one drawn to 1:12 scale and see the difference when the latter is reduced to the smaller scale.

Another aspect is that copying a works general-arrangement drawing can be dangerous as most of the outlines drawn are schematic ones, which means that only the dimensions shown on them are accurate. Very often too a subtle shape modification may have been made on the aircraft, but no effort will be made to alter a particular drawing. Dimensions too can be a problem and a recent case shows that mistakes can get through uncorrected on makers' 'G.A. of Machine' drawing, and it can, in some cases, be very easy to read a dimension wrongly.

Working recently on the Blackburn Skua – and this aircraft is no exception – and comparing G.A.'s with other published data, many confusions exist. Some are caused by model plan compilers miss-reading the data, for example, quoted dimensions have appeared giving the overall length as 34ft 10¹/₄ inches. Others have given 35ft 8³/₈ inches and 35ft 7inches – so which is correct without having a copy of the original drawing available to check?

The first dimension quoted happened to be the overall length tail-down, which was correct. The next figure was a misquote, as one copy which had been printed rather heavily showed distinctly 35.7', where

the draughtsman had missed out the 'foot' symbol and made such a short 'dash' in between that it appeared as a 'dot', and the 'inch' symbol had blocked up into what looked like a 'foot' symbol. Thus the correct overall length as measured parallel to the line of flight (tail up) was ... the latter, i.e. 35ft 7inches.

What the modeller usually comes across are plans which contain quite accurate plans and elevations, which are nicely surface detailed but contain only about three or four cross sections. In the latter case that is not nearly enough, and when a kit manufacturer works from the same plan, the resulting model may look fine when seen directly in plan or side elevation, but looks entirely wrong when viewed from a different angle.

Even where manufacturers' drawings show three or more fairly accurate plans and elevations with some component joints and skin/panel lines, the purpose of the drawing does not require sections to be shown. Thus, as has already been mentioned, we get cases time and time again where the kit makers model looks very convincing in direct plan or elevation but, in any other view, light and shade does not conform to the full size appearance because so many of the cross sections are far from accurate. Many kit Spitfire noses will confirm this situation.

Decimals or Fractions of a foot

Working from makers' sub-assembly drawings which give both overall dimensions, cross sections and a complete idea of the internal structure, are the ideal reference to work from. But with these drawings often showing a profusion of dimensions in fractions or decimals of measurement, the modeller is put off by all the addition and subtraction necessary to convert to a working scale drawing.

Most general engineering reference books show comparison tables of fractions to decimals and vice versa, together with very accurate tables for converting Imperial to Metric measurements. That's not too much of a problem and here it might be added that railway modellers, who are in many cases closer to *scale model engineering* than

many aircraft modellers, regularly publish conversion data for all sorts of dimensional information and this is really something for the *scale aviation modeller* to adopt.

Some modellers find it easier to convert to metric working, as reading off millimetres is much easier than inches or fractions of an inch. But with today's pocket calculator to hand none of this dimensional activity should be a problem! Set up a scale for the conversion and, even if it came out at something like 12.6743mm to the foot, the calculator can easily handle any dimension. All the modeller has to do is to round off the figure to one or more decimal points.

For example: 20ft 6inches at 12.6743mm to the foot = 259.82315mm and rounding off at 259.8mm is a very easy dimension to measure, and probably is as accurate as most modellers would want to go.

Even so, many modellers (both aircraft and railway) continue to work in fractions but find it a hard struggle and, in railway terms, they enquired as long ago as the 1950s if there was some easy way to add and subtract fractions!

Easy Graphical Solution

It so happened that during the 1950s, Fairey Aviation Co. were going through a phase of repairing and updating their vast collection of models which dated back to 1916, many of which had been damaged during wartime storage. They also required that construction drawings of past aircraft be redrawn (ie. photographic copies) and have rounded off dimensions suited to the scale of the model. The task was a daunting one to undertake.

There had to be an easier answer than writing down sets of fractional figures each time and laboriously adding or subtracting a mixture of anything from eighths to sixty-fourths every few seconds! As a memory aid, a vertical column of squares was marked off on a piece of graph paper, it then being much easier to total a given number of squares but it was still necessary to convert from a large number of sixty-fourths or similar number to get the final answer.

Having then found that the addition of a horizontal axis of squares enabled any denomination of fraction to be added to another by counting each amount along a separate axis scale, the answer was shown by running a diagonal from the outermost corner of the square or rectangle formed by the two fractions, to one or other of the axes, a complete 'fractions' square could be drawn, from which answers could be shown without the need to convert them.

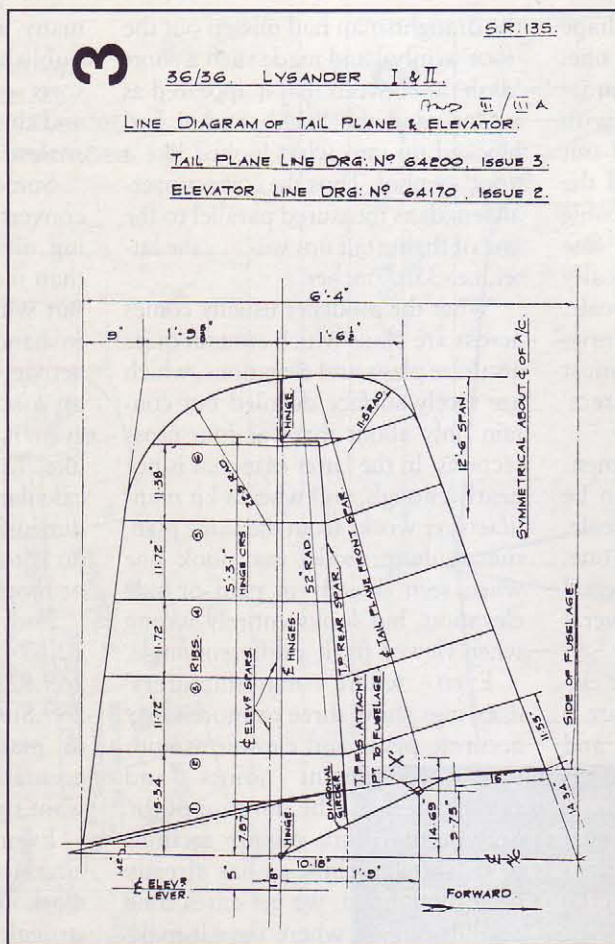
The 'Decimal Foot' Rule

Whilst with standard engineering tables, conversion of fractions to decimals has been shown to be relatively easy, finding aircraft drawings where all dimensions are given as decimals of a foot can cause problems. Dividing the primary number of feet by twelve, leaving a remainder which, added to the figure after the decimal point, gives an answer which can then be converted to fractions by means of the table, is a little time consuming.

This is where a foot rule, divided into tenths and each tenth into tenths again (and again if necessary) comes in useful as its edge can be laid directly against a fractions rule and the answer read off to the nearest sixty-fourth very quickly. Such a rule can be made by scribing on a piece of plastic strip. Rub some black paint over the scribings and clean off the surplus – a very useful tool will emerge.

Plans galore

Many requests are received from modellers desiring to make models of obscure or less well known aircraft types. The subjects requested can vary from a General Aircraft Owllet to a Martin Maryland or something far more obscure such as a General Aircraft Monospar Universal. "No plans seem to be available, so how can I model this



The final horizontal tail surface had a further increase of tailplane area by making a more blunt tip. It was retrospectively fitted to all early machines.

type?" is the usual request.

Mentioned before in this column, if you have a silhouette and, particularly, if it is a Ministry one, plus a set of basic dimensions, then the basis of a fairly accurate plan is there, albeit rather small in that particular form. It is a matter of getting it enlarged and then tracing off the outline and replacing the over thick white lines with very thin black ones.

What you will then have is probably a similar sized drawing which saw the creation of the silhouette in the first instance. In most cases they were drawn from fairly accurate G.A.'s by the manufacturer at Ministry request, who then transformed them into negative form of white shape on black background. By photographic means the image was then reversed and reduced into a small black shape with white lines and background. By setting up a scale on the enlargement and

drawing all surface details in, and paying heed to published dimensions and other data to be found, the basis of a scale plan soon takes shape. Certainly many adjustments will have to be made in converting thick lines to thin, and some subtle cleaning up is often needed, but the end result is very much better than having to start from scratch – and guessing it at that.

Once the basic outline has been made, it is a matter of perhaps leaving the drawing on file but to keep coming back to it each time some new detail is discovered and adding to the slowly growing reference. Now that the plan and elevations have been established the next task is to start creating cross-sections. Careful study of photographs is necessary and, of course, the full scale subject if one is available.

Aircraft modifications

Mike Stephens, from the Humberside area, faced many problems with the Westland Lysander, as some of the photographic references, model plans and dimensional details did not seem to tie up.

As it happened, a very early photograph he had was cross referenced to a tailplane and elevator root chord (on the aircraft centre-line) that differed considerably from that shown on what appeared to be reasonably accurate plan. Was the plan wrong or were the dimensions wrong?

The problem was due to airframe modification work. Often a prototype will fly in a certain configuration and will then be found lacking, controlwise, which results in a larger surface area being created. Or it may be that an already established type will, because of a change of role, need to have a larger fin, and so on.

The Lysander, with its short fuselage, had a few longitudinal

stability problems when the engine was suddenly opened up as in the transition from slow to faster flight and vice versa. When the slats opened and with flaps down, nose-down trim was rapidly needed. So a larger tailplane was considered, increasing the chord by a fair amount and rounding off the tip. However that upset trim when gliding in to land. The remedy seemed to be a 'flying' tailplane which could be trimmed to a large negative angle but again, there were trim problems during an overshoot situation when on opening up the engine, the nose shot up violently. A problem which could not be easily overcome as it took time to re-trim the machine quickly.

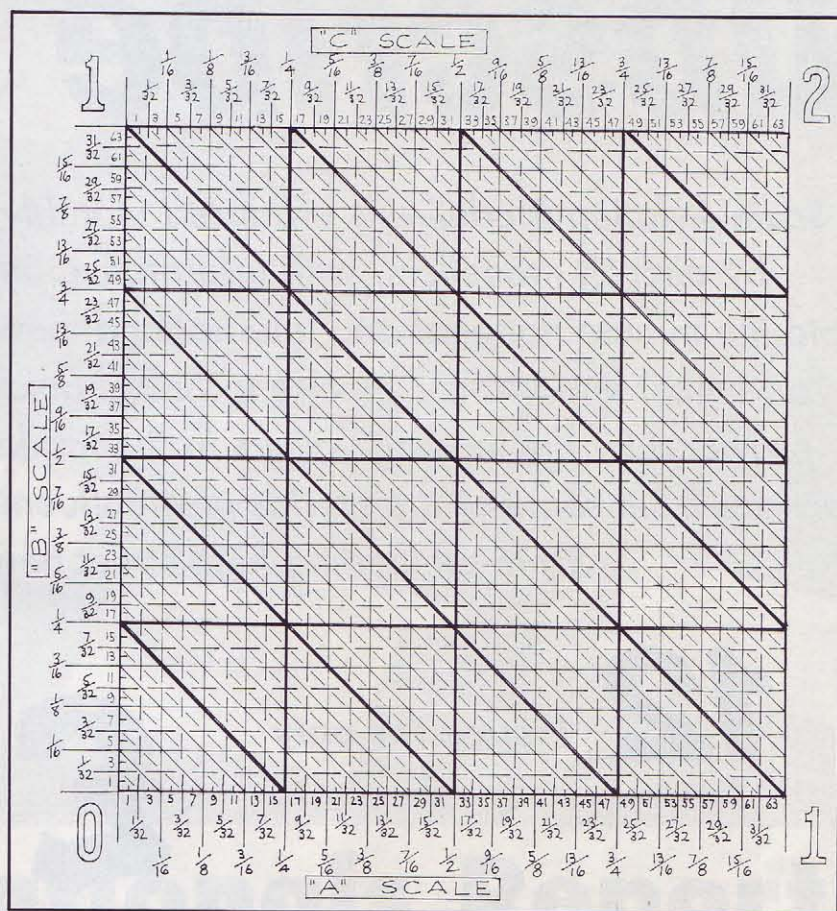
The new moving and larger tailplane was standard on the Mk.I's with the Pilot's Notes recommending that a slow throttle opening was made whilst winding the trimmer as quickly as possible at the same time. On the Mk. II's and subsequent aircraft (plus retrospectively modified machines) a further increase in tailplane area was made, mainly by introducing a less rounded tip.

In these three tailplane configurations the elevator remained almost the same overall shape apart from slightly blending the tip curve once, giving a slight change of area. For the purist this was something of a nightmare in attempting to find dimensional changes for each case.

The span remained at 12ft 6in. in each case, with the original total tailplane and elevator chord at 5ft 6in. The subsequent two modifications set a new chord of 6ft 4in. in each case. But the main difficulty was in the subtle increased tailplane chord and tip curve dimensions, as the drawings reproduced in this article show! Notice however, that the dimensions are mixed up in feet and inches, fractions of inches and decimal inches, all in the same drawing.

This is where both conversion tables and the Graphmaster come in handy to arrive at some simplified scale dimensions.

With the Lysander too, the Mk.I and Mk.III had the Bristol Mercury engine, whilst the Mk.II had a change to the Bristol Perseus, the latter having a much shorter length cowlings and did not have the 'blis-



EXAMPLE:

To add - $3/8$ ths and $25/32$ nds - Start at $3/8$ on the 'A' scale and travel vertically until the horizontal of $25/32$ on the 'B' scale is intersected. Then travel up the diagonal and read off the result on the 'C' scale. The answer is '1 and $5/32$ inches'. **To subtract** - $7/16$ ths from 1 and $15/64$ ths - reverse the procedure. Travel down the diagonal from 1 and $15/64$ on the 'C' scale until the horizontal from $7/16$ on the 'B' scale intersects. Then travel down the vertical to read off the answer on the 'A' scale. The answer is ' $51/64$ ths of an inch'.

GRAPHMASTER

M.L.T. PRODUCTIONS

IAN HUNTLEY

ters' over each cylinder head in the former's cowlings.

Most of the more recent and highly detailed Lysander plans I have seen show well the fuselage stringer lines in the side elevation and underside plan, but do not show them on the cross sections which, admittedly, would require some very careful draughtsmanship.

However as the very fine 'clinker built' effect is so readily seen on this aircraft it must be remembered that each cross section should show the same effect. But how to achieve that on a 1:72 scale model? Possibly the only answer is to carefully scribe some very fine lines along the fuselage length, to give an impression of stringers.

In the next issue of Scale Aviation Modeller, Ian Huntley explores 1918 Austrian camouflage patterns and the rapid changes of colour scheme brought on by the Phoney War in 1940.

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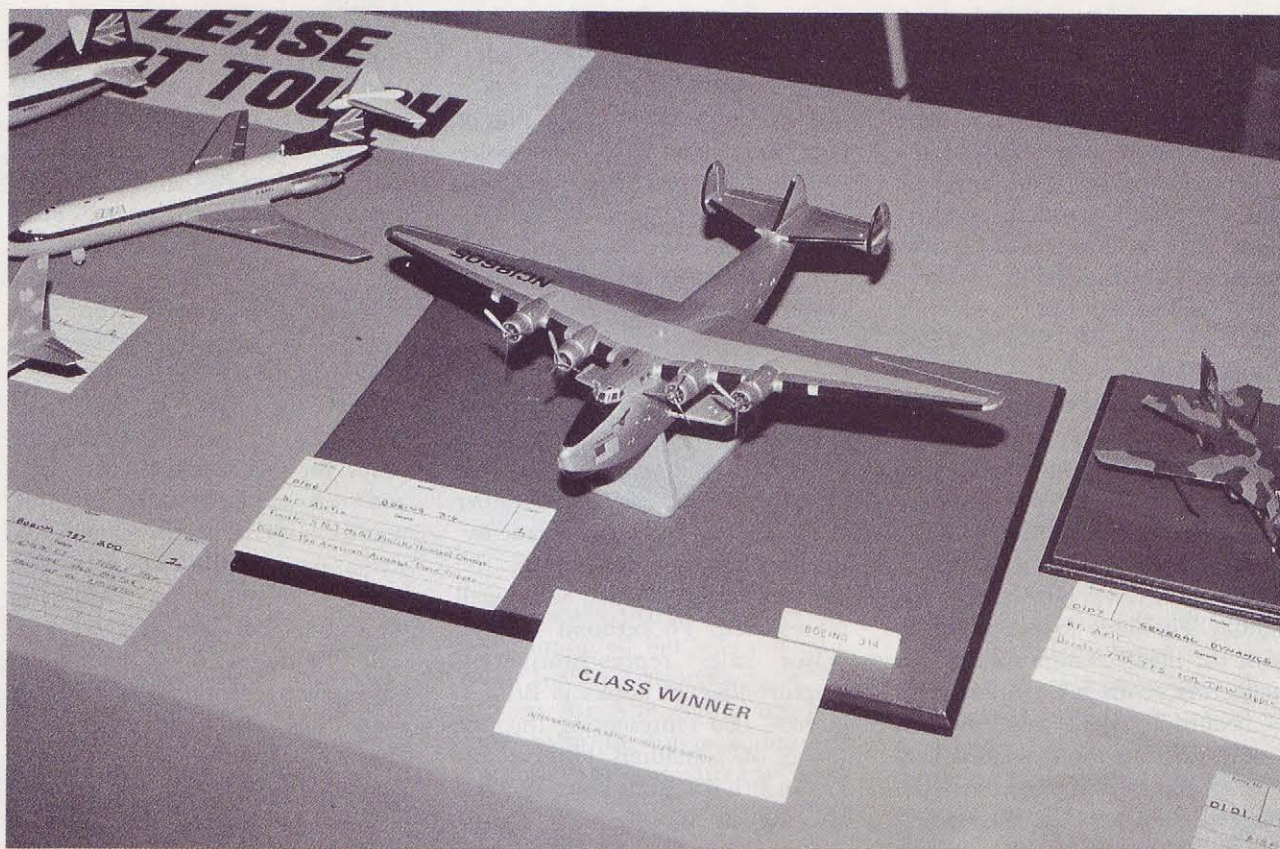
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IPMS Nationals Report

Malcolm V. Lowe spends a hectic day at Donington Park

The biggest and most significant modelling event of the year, the two-day IPMS Nationals at Donington Park's International Exhibition Centre on 12-13 November once more proved to be a mecca for those with an interest in modelling, with the finest examples of the modellers' craft on display. A wide range of traders and manufacturers both large and

small complemented the many excellent model displays and Club stands. With an attendance which by early accounts was well up on last year, this year's exhibition again proved to be a thoroughly successful event. Nevertheless, the Show was sadly overshadowed on its final day with the tragic news of the untimely death of Mike Keep, and the many expressions of sym-

pathy from those in attendance well illustrated the high regards with which this true professional was held in the modelling magazine and technical drawing fields.

The Nationals are always a showcase for the many Clubs, affiliated organizations and Special Interest Groups that are associated with the IPMS, and this year proved no exception. Literally thousands of models from a wide variety of Clubs and groups up and down the country were on display. Foreign participa-



Top: Peter Westbrook won Class 1, for aircraft up to and including 1:144th scale, with this superb Boeing 314 based on the Airfix kit. (All photographs by author) Left: Martin Hale, leader of the IPMS Fleet Air Arm Special Interest Group, made this superb scratch-built Hiller HT-2 helicopter, which won the Davies Trophy in the IPMS championships.

tion was also well to the fore, with IMPS France in particular once more proving to be stalwarts of the exhibition. Indeed, there were foreign visitors and traders from as far afield as the Czech Republic and beyond, including visitors from such far-flung Clubs as the Association Maquettiste Varoise from the South of France which is twinned with the Poole Viking Model Club in Dorset.

Each year, the exhibition's competitions receive a large number and wide variety of entries, with the IPMS members-only championships being held on the Saturday of the show and an Open competition for non-IPMS members on the Sunday. The sheer size – particularly of the IPMS championships – is staggering, with table upon table of beautifully made and finished models creating a major numerical and quality challenge for the judges of the various competition classes. Many of the models are made from difficult vac-forms or basic injection-moulded kits with a great deal of extra detail added, while others are scratchbuilt models or home-spun conversions of commercially produced kits. The Open competitions generally draw a slightly smaller turnout but nonetheless I myself was delighted to win two of the aircraft classes on the second day of the championships. As ever there are Junior competitions as well, with one of the general themes of the whole event being to encourage young people into the fascination and rewarding world of modelmaking.

The Nationals are jointly sponsored by The Aviation Hobby Shop, Midland Counties Publications and the famous injection-moulded kit producer Revell. Midland Counties provided the largest trade stand amongst the various organisations devoted to aviation and military books and

A fascinating trade stand was that of Toad Resins, with a selection of Luftwaffe projects and designs from the closing stages of World War 2, including the impressive four-engine kit to 1:72nd scale of the Junkers Ju 488.

magazines. An increasingly popular feature at the show is the company's signing sessions, in which well-known authors sign copies of their latest and previous books. Amongst the celebrities this year was Roger Freeman, whose writing, especially on the US Army Air Forces during World War 2, has become legendary.

New from the trade

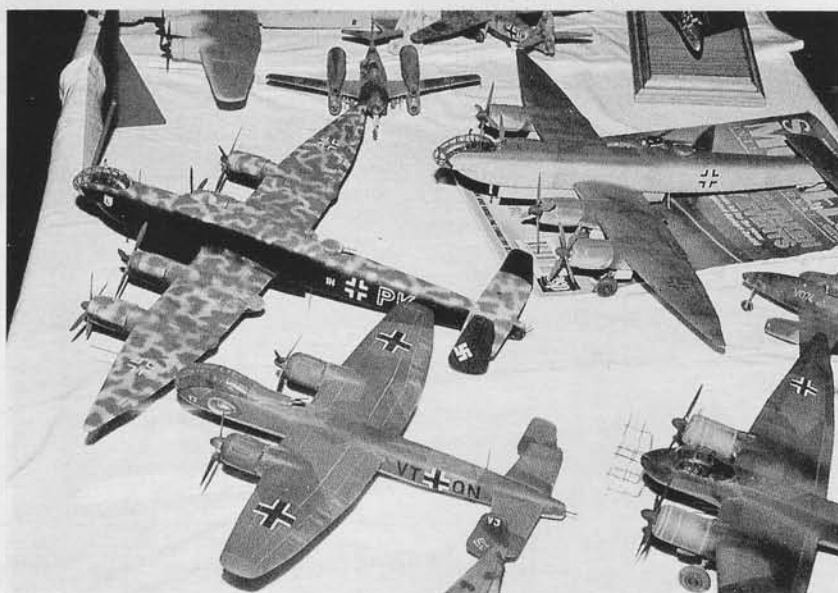
Over the years the Nationals have become an important shop-window for some of the major kit producers, with Airfix and Heller (Humbrol), Revell, and Academy-Minicraft (the latter on the Toyway stand) being very well represented. Pocketbond Ltd., a major sales representative of Squadron/Signal books in Britain, is now also representing the fine range of Canadian HobbyCraft kits in Britain. Both Humbrol and also Revell have recently undergone changes of ownership. Humbrol, including Airfix and Heller, are now owned by Allen and Maguire & Partners, a Dublin-based investment company with an excellent track record, which is prepared to invest substantially in the future of these brands. Airfix has fared particularly well in recent months due to the overwhelming success of its 1:48th scale Buccaneer kit, and the future for this famous name now seems well assured.

The large number of traders to be found at the Nationals encom-

passes all the major model shops in England, with such well-known companies as the Aviation Hobby Shop, Hannants, Maintrack, ED Models and Mary-L plus other smaller enterprises in attendance, together with other traders whose speciality is older hard-to-find kits and second-hand items, including such companies as Plastic Past Times and Kingkit (Malcolm Rolling).

The Nationals in fact have become an increasingly significant venue for the release of new kits, and such was particularly true this year for both the large companies as well as many of the smaller 'cottage industry' manufacturers. Amongst the various kits either released specially for the event, or making an appearance at around the same time as the Nationals, pride of place was arguably captured by Aeroclub's incredible 1:48th scale Vulcan multimedia kit, while ID Models' impressive 1:72nd scale C-5 Galaxy vac-form can now claim to be the most expensive current 1:72nd scale kit at around £75!

Other important releases include Magna Models' 1:72nd scale resin Sea Vixen, a worthy addition to this manufacturer's fine range of mainly Fleet Air Arm subjects. Skybirds '86 has released a series of resin Hawker Hunters in 1:72 scale, including single and two-seat versions; Mike Eacock has also produced a World War 1-vintage Lloyd VC for release at the show, similarly in resin with white





metal parts. Aeroclub's significant range of kits also now includes a Hawker Osprey (injection-moulded with white metal parts and vac-formed floats), a Monospar (injection-moulded with white metal parts), and a Sea Otter (mixed-media) – all to 1:72nd scale. Maintrack Models continue to add to its range of vac-formed 'Project-X' kits with the release of a 1:72nd scale Boulton-Paul P.111, and also new from this manufacturer is a resin conversion kit to convert the Airfix 1:48th scale Buccaneer into a Royal Navy S.1 version.

Toad Resins' impressive fleet of Luftwaffe late-World War 2 aircraft and projects continues to expand, with the release at the Nationals of a conversion set in 1:72nd scale to make a Heinkel He 277 from the old Airfix He 177 kit, plus a complete kit of the Messerschmitt Me 329. Toad also released a bomb-bay and wheel well detail set for the He 177 and He 277, while due for release in the near future are the Focke-Wulf Ta 283 and Messerschmitt Me 209V-6. Toad also produces what is currently the second most expensive 1:72nd scale kit, the impressive Junkers Ju 488.

PP Models' range now includes a detail set in 1:48th scale to go with HobbyCraft's Sea Fury FB.11 kit, a near complement to PP's established and successful mixed-media kit of the Fairey Firefly in 1:48th scale. A detail set for the

1:48th scale Airfix Buccaneer was also rumoured but was not quite ready for the Nationals.

Fleet Air Arm enthusiasts continue to profit, for in addition to the relevant kits already mentioned, the recent appearance of Dynavector's 1:48th scale vac-form Westland Wyvern goes nicely with the company's Fairey Gannet in the same scale. In addition to the selection of kits produced by Toad Resins, Luftwaffe fans with a taste for the more unusual are also well catered for by several other companies, Fruitbat Productions' 1:72nd scale resin Horten Vc flying wing kit having been recently released, as was Arba Resins' Me 263 (Ju 248) resin kit in 1:48th scale.

Another impressive kit making its first Nationals appearance was Resitech's 1:72nd scale resin TSR.2 kit, which adds to this company's 1:48th scale resin Heston Napier racer, and earlier de Havilland Comet Racer from the same source.

Smaller scales

Kits in 1:144th scale continue to prove popular, and amongst the 'cottage industry' manufacturers who produce kits to this scale, Air Craft Models recently added a vac-form Martin Mars to its range, while Welsh Models' large catalogue and ever-growing range now features a Boeing 707-331B/C which was new at the show and quickly proved popular. Welsh Models has a large list of

The author's Hawker Siddeley Andover, based on the Welsh Models vac-form kit, won the 1:144th scale class in the Open Competitions on Sunday 13 November at the IPMS National Championships.

mouth-watering projected future releases, including 1:144th models of such diverse subjects as the Curtiss C-46, C-124 Globemaster, Breguet 'Sahara', Douglas DC-2 and Jetstream 41.

A brand new manufacturer, with a first release at the Nationals is Rugrat Resins. This Dorset-based producer proudly displayed its 1:72nd scale kit of the Airspeed Envoy, which has already proven to be a popular release.

While the foregoing provides a representative cross-section of the continuing success of the smaller kit manufacturers and the obvious market for the products that they provide, not to be outdone the established large injection-moulded kit producers have also shown their confidence with a veritable flood of new releases and re-released kits in recent months. Some of these appeared at the same time as the Nationals, and had their first major airing on various stands at the show.

Academy-Minicraft's continually-expanded range of very neat injection-moulded kits now includes a Lockheed P-38M in 1:48th scale, with a similarly-competitively priced P-38E (approximately £11.99) in the pipeline. An addition to Academy-Minicraft's range of 1:72nd scale Flying Fortress models will be a Coastal Command version at some future time, while an addition to the fine range of 1:72nd B-24 Liberators includes a special 'nose-art' issue of the B-24D kit. An eagerly-awaited release for the future will be a 1:48th scale two-seat Sukhoi Su-27, which should appear early in 1995. Toyway's stand was very busy at the show!

An important release at the time of the Nationals was a new kit from Emhar, this being an injection-moulded Lockheed F-94C Starfire. Releases and re-releases



from Hasegawa include 1:72nd scale kits of the F4F-4 Wildcat; Me 109G in Finnish markings; a 'nose-art' Curtiss P-40N; French Air Force Jaguar in anniversary markings; another re-appearance for the company's P-51D Mustang; the F-20 Tigershark in demonstrator colours; and re-appearances of the F/A-18 Hornet, Focke Wulf Fw 190D, and Me 262A with different markings options. Recent 1:48th scale special releases include a Spitfire Vb floatplane (at least one model shop – the Aviation Hobby Shop – immediately sold its initial batch) and Fiat G.50, plus a Dutch F-16A Fighting Falcon in Tiger Meet markings. Fujimi recently released or re-released kits making their first appearance at the Nationals included new markings for the 1:72nd scale A-7E Corsair II and A-6E Intruder kits, and the 1:48th scale Me 109K-4 and G-6 with special markings.

Italeri's recent releases include a 1:72nd scale Eurofighter 2000, and a 1:48th scale F-16C/D Fighting Falcon, while Dragon's eagerly-awaited Northrop P-61A and P-61B Black Widow kits were newly available at the time of the Nationals – the manufacturer's Dornier Do 335B in 1:72nd scale and 1:144th kits of the Tornado E.3 and F-14 Tomcat in VF-41 low-visibility markings were also in evidence.

Luftwaffe enthusiasts are catered for by Revell's release of

the Horten Ho 229 flying wing and Messerschmitt Bf 110E in 1:72nd scale, and the company's long-awaited Arado Ar 240 in the same scale is due for imminent release. Tamiya's continued release programme of aircraft kits is due to include two new Focke Wulf Fw 190 kits in 1:48th scale, although these were not available in time for the Nationals.

AMT/ERTL continues to produce a number of interesting releases, with two new B-52 Strato-fortresses in 1:72nd scale, and the same company's 1:48th scale Douglas A-20 Havoc is already proving to be highly popular.

Decals and paints

In addition to kits and conversions, a wide range of new and recent releases of decal sheets from an increasingly large number of companies were on sale at the show. Too numerous to list here, these included the long-established range of SuperScale transfers which has recently expanded to include several new World War 2 sheets, including 1:72nd scale markings for Liberators, Mustangs, Thunderbolts and Mitchells, all in US colours, including some rare markings for 'N' model P-47 Thunderbolts, plus Yak-3 fighters in Free French colours. Similar releases for most of these US subjects have also appeared in SuperScale's 1:48th scale range.

The more recently-established

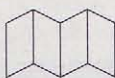
One of the important 'cottage industry' kits that made its debut at the Nationals was Resitech's impressive 1:72nd scale TSR.2, a subject that will almost certainly prove very popular.

selection of decals by Aeromaster is also rapidly expanding, and this company's range of model paints has also been increased recently to include more Luftwaffe colours, several contemporary US colours, plus more British, Japanese, French and Finnish colours for the Second World War. On the subject of paint, Xtracolour paints produced by Hannants also now include World War 2 French Air Force colours, a welcome addition to this established and highly-regarded range of paints.

Other new decals released at the time of the Nationals include 1:72nd scale sheets produced by Pegasus of 5-colour lozenge patterns (upper and lower wing surface) for World War 1 aircraft. A new release by Model Art which had not appeared at the time of the Nationals features a number of Fairey Gannets in 1:72nd scale: these will be eagerly sought when they are released. Amongst the new transfers by Blue Rider at the Nationals were 1:72nd scale sheets for aircraft of the Carinthian air war in 1919–20, Serbian-operated aircraft 1912–15, Royal Siamese Aeronautical Service post-World War 1 aircraft, Middle Lithuanian and early Czechoslovak subjects, and contemporary Lithuanian and Ukrainian-operated aircraft.

With so much to see on the many trade stands, Club stands, Special Interest Group displays and in the competition areas, the Nationals are a great deal to take in during just one day, and many visitors now make the annual pilgrimage to the show for both days. If you were unfortunate enough to miss this year's Nationals then you really missed an excellent event, and all that I can do is to recommend that you make a point of visiting next year's show which promises to be even bigger and better than ever.

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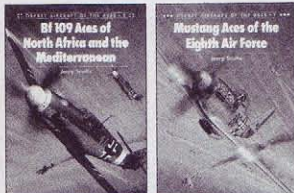
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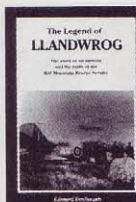
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FIGHTERS

A selection of pictures from the Archive of Modern Conflict

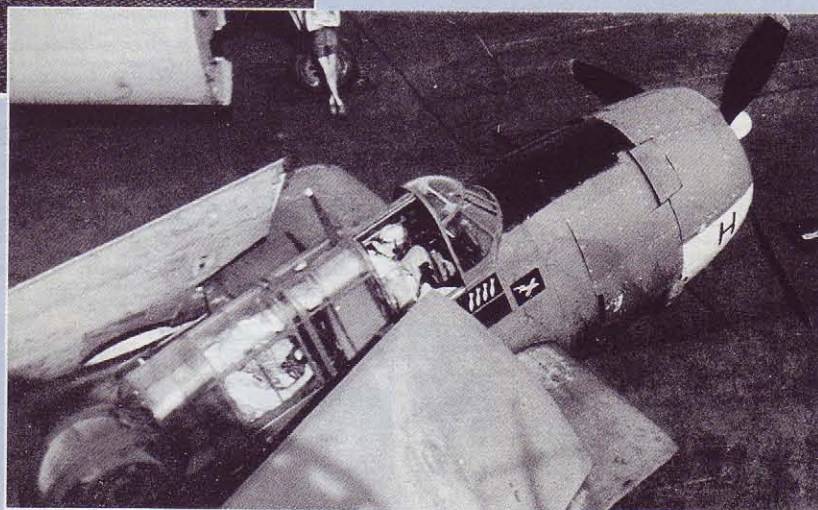
Right: Grumman Martlet IIs, possibly of 882 Naval Air Squadron, Fleet Air Arm, embarked on HMS *Illustrious*. The picture may have been taken in summer 1942 in the Indian Ocean after the Allied landings in Madagascar. Visible serials are AJ129, AJ149 and AJ153.



Left: An immaculate P.W.S. 10 fighter, 4-17, in an overall grey finish shown undergoing repairs. Already relegated to training duties by the Poles, the twenty *Pavipollos* (chickens) sold to the Spanish Nationalists were rapidly found to be just as unsuitable as fighters in Spain owing to a tendency to drop a wing on landing, which combined with a narrow undercarriage to cause several accidents. The machine shown here is at Jerez de la Frontera, probably shortly after arrival at the training school there in early 1937, and the notorious landing problems have already destroyed the starboard wheel.



Left: 'Dottie', a North American P-51B belonging to the 317th Fighter Squadron of the 325th Fighter Group, the *Checkertail Clan*, Italy 1944. Black and yellow checks on both vertical and horizontal tail and a red nose and spinner make a very colourful subject for a model. Note the later P-51Ds of the same unit in the background.



Right: A real mystery – a Grumman Avenger coded 'H', supposedly aboard HMS *Illustrious*. Note the kill marking of a V-1 under the windscreen! (Bernard Collier)

Right: An excellent view of Messerschmitt Bf 109Gs lined up at the war's end outside Munich. In the foreground is the Hungarian-flown G-10 Werk No. 613165, Black '16', which was built at the Wiener-Neustadt works and fitted with a DB605D engine. The late-war Hungarian crosses are clearly shown, being a hollow black outline on the wings, and filled in with grey on the fuselage. Both the upper half of the rudder and the band on the nose are probably yellow. Behind is White 12', a German flown Bf 109G-10, with a yellow nose band, rudder and faded second Gruppe bar. Next in line is red or possibly green '19', Werk No. 613195, again with yellow nose band and rudder. Note that the spinner is also the same colour as the fuselage number. Further back still, there are at least two more Hungarian Bf 109s, one of which still carries a swastika on the fin. As can be seen, some Hungarian units fought to the last with the Germans.



Right: A beautiful factory photo of the underside of the third prototype Gloster Javelin GA.5 night fighter, WT827, on test over the Gloucestershire countryside sometime in 1953. The first Javelin to actually carry a radome and armament, it is shown here with an experimental bull-nose radome.



These pictures are a small and random selection for the remarkable Archive of Modern Conflict. You may not have heard of it before, but it promises to become one of the most important sources of new information for scale aeromodellers anywhere.

Founded two years ago, the Archive was begun with the intention of gathering together the private records of some of the many thousands of people from all over the world, and from all nations, who have been affected by wars.

It is unique because most of the 120,000 images contained within many hundreds of albums have never been published. The pictures represent the individual experiences of those directly involved in conflicts, whether at sea, on the ground or in the air, spanning a significant period of recent history, ranging from before the siege of Paris in the 1870s up to Belfast today.

It has acquired private albums and documents concerning actions ranging from British Expeditionary campaigns in Egypt and India, German fighter units in World War 1, the French Foreign Legion in Algeria and

the Viet Cong on the Ho Chi Minh trail to British troops on patrol in Northern Ireland. Specifically aviation sections cover US and RAF aviation activities in Europe, the Mediterranean, in Germany and the Pacific; there is an outstanding collection of Spanish Civil War and Luftwaffe albums to name but a few.

The collection continues to grow, and is constantly seeking new and unusual material. As the collections are progressively catalogued, they will be able to offer a picture library service for scale modellers and enthusiasts, as well as publishers, historians and researchers. Eventually the entire collection will be accessible through a comprehensive computer database, thereby providing easily available primary information on world-wide conflicts.

For further information contact:

Graham Noble, Assistant Curator, The Archive of Modern Conflict

Tel/Fax: 071 916 3058

Kit Conversion

by Jonathan Mock

“One of the finest shipboard aeroplanes ever created”.

So wrote Captain Eric Brown who headed the Aerodynamics Flight at Farnborough and was perhaps the most experienced wartime test pilot. The object of his praise? Well, it wasn't the sleek and fast F4U Corsair, neither was it the mighty F6F Hellcat. In fact the aircraft in question was almost the exact opposite, being small, squat and rather podgy. It was the Grumman F4F Wildcat, an aircraft that may pale in comparison to its successors, but shouldered the burden of being the US Navy's and US Marine Corps main front line fighter during America's early war years and what it might have lacked in performance, it made up for in power and guts.

The F4Fs combat debut came with the Royal Navy, who christened the aircraft Martlet and it won the distinction of being the first American fighter to shoot down an enemy aircraft, when on December 7th 1940 Martlet's from No 804 Sqn shot down a JU88 over Scapa Flow.

On the other side of the world the Wildcat found itself initially out-classed by battle-hardened Japanese pilots in the then-superior

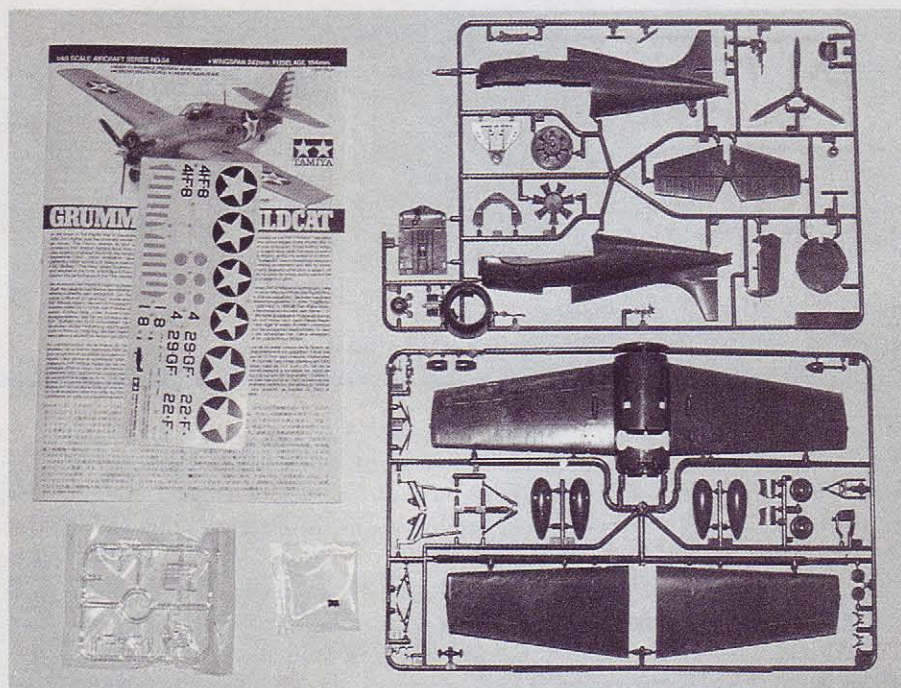
Mitsubishi Zero. Despite this, the Wildcat possessed greater, more concentrated firepower and a much tougher airframe, and in experienced hands it was able to bite back with effect. It made aces out of pilots like Joe Foss, Edward “Butch” O'Hare and John S. Thach. It saw service in the Pacific, North Atlantic, mainland Europe and even in the Western Desert from 1940 to the end of the war. Perhaps more significantly it was the first of the Grumman ‘cats’, a

depicts the six, a folding wing F4F-4 variant and surface detail features neat recessed panel detail and a mix of raised and engraved rivets. The wings are moulded ‘rigid’ with no provision to pose it folded, the undersides are supplied full-span including the ventral part of the fuselage. The cowling is a separate one piece moulding as are the rudder and tailplanes. Decals are provided for four American Wildcats.

Tamiya's sound engineering and intelligent breakdown of major

components takes the hard work out of building the kit, leaving you to clean up a few seam lines and to exercise your skills in picking out the excellent detail on show, or to add more of your own. Construction wise, Tamiya's Wildcat is enjoyable and would be a good choice for a newcomer to 1:48 scale but as a modelling experience its hardly a challenge so I sought a way to add a more personal stamp to my model. I had long wanted to add a

Fleet Air Arm Martlet to my collection and so I decided to model the General Motors built FM-1/Martlet V. Despite a superficial resemblance to the F4F-4, the FM-1 differed in having only the four inboard guns and subsequent removal of the access panels on the wings. These changes, as well as some minor amendments to the kit itself, open up another range of finishing options.

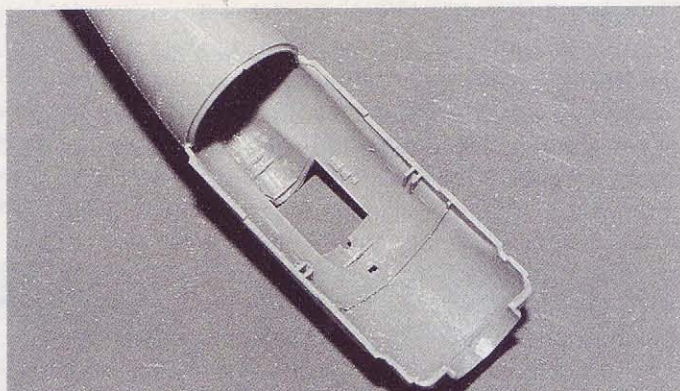


Spread of parts for Tamiya's 1:48 F4F-4 Wildcat. © 1994 Jonathan Mock.

proud lineage that survives to this day with the mighty F-14 Tomcat.

CAT IN A BOX

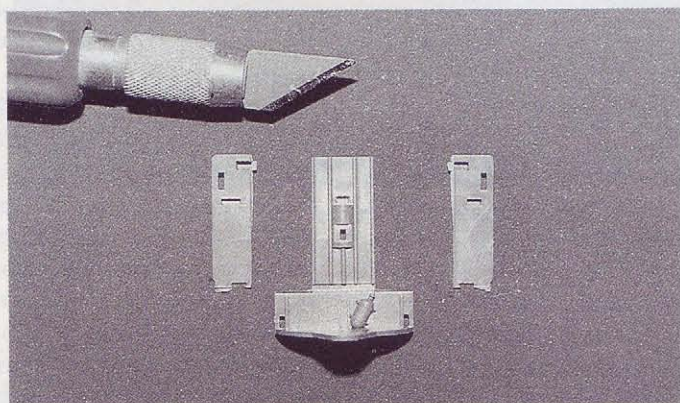
The arrival of Tamiya's new 1:48 scale Wildcat is most welcome as the only viable alternative prior was Monogram's aged kit, and early effort that was a mix of various marks and also included ‘working features’. Tamiya's all-new kit



The large cut out for the wings means easy access to the cockpit even with the fuselage halves joined © 1994 Jonathon Mock

STAGE 1

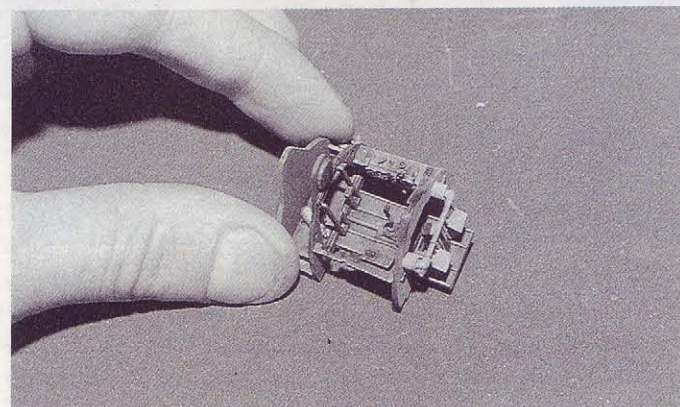
My first step was to fix the two fuselage halves together, the huge underside cut-out for the wings meant that that the whole cockpit assembly could be slipped into place later.



Removing the 'floor' from the kits cockpit. © 1994 Jonathon Mock

STAGE 2

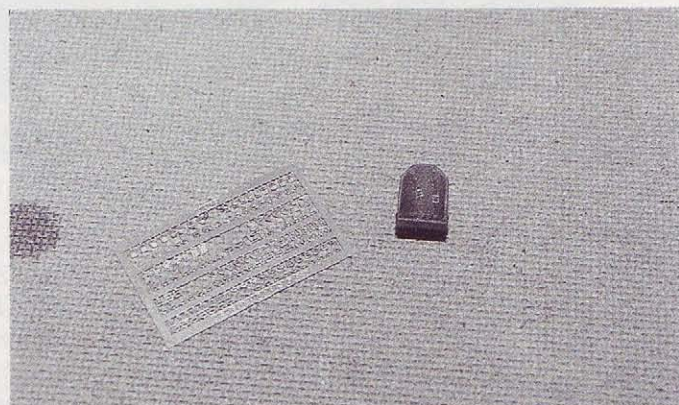
Construction proper started with the cockpit floor - or rather the removal of it. The Wildcat had no floor as such, just a couple of heel boards that lead up to the rudder pedals, the rest being open space so that the pilot could see through the ventral window either side of the fuel tank. Modifying the kits 'floor' was simple, just a case of sawing away the unwanted areas either side of the heel boards and cleaning up.



The finished cockpit builds up incredibly well straight from the box © 1994 Jonathon Mock

STAGE 3

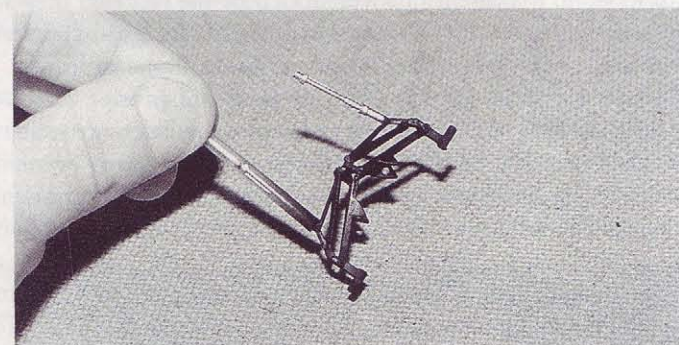
Tamiya's rendering of the cockpit is superb, a real work of art in miniature. Even with a mass of Wildcat references in front of me I found very little to add. I sprayed the various parts in differing shades of interior green and painted the radio boxes, levers and instrument panel in very dark grey. Drybrush and wash techniques were used to enhance the detail. I drybrushed the dial face on the instrument panel with flat white and 'glazed' them with drops of epoxy adhesive.



Adding etched harness detail using parts from the Reheat range © 1994 Jonathon Mock

STAGE 4

I added seat straps and buckles from the Reheat range of etched accessories. I had pre-sprayed the etched fret in flat aluminium so all I had to do was thread strips of the fabric material supplied by Reheat through the buckles while they were still intact on the fret. Once the strap was in place the buckle was snipped away with a scalpel. The finished straps were superglued to the kits seat which was then installed into the cockpit sub-assembly.



Lengths of tubing were used to mask out the silver areas of the undercarriage when spraying the black areas. © 1994 Jonathon Mock

STAGE 5

Like the cockpit, the wheel well is also a superb rendering of the real thing right down to the oil cooler just inside the bay. The Wildcat's undercarriage is complex web and often a point of simplification with previous kits. Again, an intelligent breakdown of parts has enabled Tamiya to faithfully reproduce this area without undue complication. The retraction gear chain and sprockets can be carefully picked out with a gun metal colour before fixing the two sets of interior struts to the rear bulkhead, and here Tamiya suggest painting the area white, though I would guess that the flat aluminium lacquer that was applied to these areas may have fooled them. I use Humbrol's Matt Aluminium from

their Metalcote range. In order not to craze the oil based aluminium paint, I gave these areas a wash of black/brown acrylic to accentuate the detail. Incidentally, the concave recess of the wheel was often painted the same colour as the underside finish.

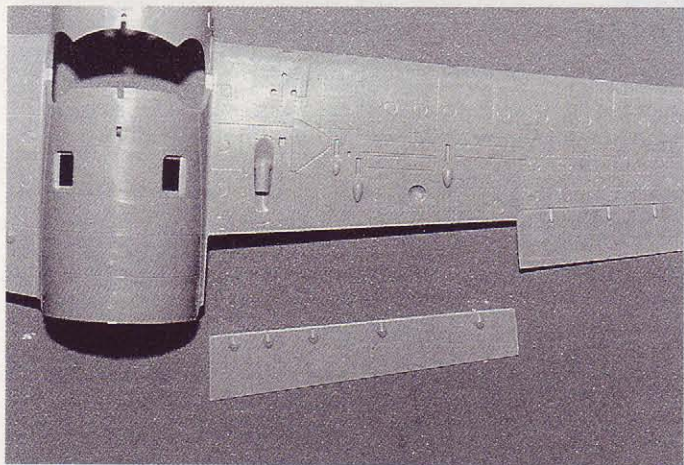
The undercarriage legs are made up of three sets of struts which all interlock neatly and look pleasingly complex when finished. These were usually painted with aluminium lacquer with the lower portions finished in black. I sprayed the finished assemblies with flat aluminium and then masked off the upper leg struts with two protective caps from long gone paintbrushes, although straws will do just as well. The lower portions of the legs were airbrushed with Tamiya's Flat Black (XF-1).



Strips of masking tape were used to mark out the replacement vac-formed canopy before cutting out © 1994 Jonathon Mock

STAGE 6

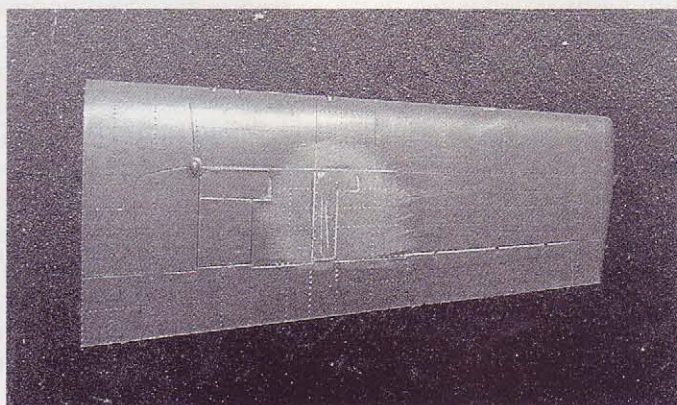
Tamiya's two-piece canopy is nice but I had planned to use the excellent Falcon vac-formed transparencies on my model. I carefully marked out the vac-formed parts with masking tape before cutting them out with a sharp pair of nail scissors. My intentions were foiled by the fact that they were designed for the Monogram kit and the windscreen contours wouldn't quite match those of the Tamiya Wildcat. However, as I wanted to pose the canopy slide back I was able to use the rear portion of the Falcon part in conjunction with Tamiya's windscreen. Both pieces were masked off with Tamiya's own masking tape and the interiors were protected from overspray using Humbrol's Maskol.



Flaps Down : The kit parts were cut away prior to detailing with plastic strip © 1994 Jonathon Mock

STAGE 7

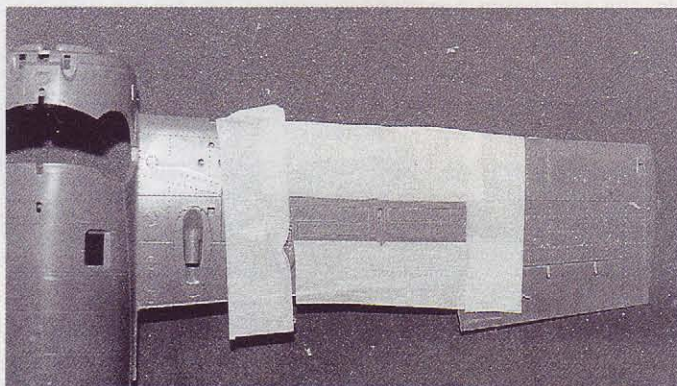
I had toyed with the idea of trying to fold the wings back but decided against this - on my next one perhaps! Instead I decided to drop the flaps, a feature that would add interest to the model while being fairly easy to achieve. To this end I gently scored around the flap areas on the underside of the wings until they snapped away with ease. The inner surfaces of the flaps and upper wing sections were sanded smooth before pencilling in the positions for the internal rib detail and then gluing the wing parts together. There should be twelve ribs, nine corresponding to the main flap and the other three on the smaller units inboard of the wing fold hinge. I cut each rib from plastic strip and secured them in place with liquid cement.



The outer wing gun panels were carefully scraped away and sanded smooth prior to filling © 1994 Jonathon Mock

STAGE 8

As I was modelling the four-gun version, I had to remove the outer access panels on the wings as well as the additional blister faring on the undersides. Normally this wouldn't be a problem, but care had to be taken not to obliterate the surrounding recessed rivets and there was also the added challenge of restoring some kind of continuity to the surface detail on the finished model. The unwanted upper wing gun panels were scraped away, filled with Greenstuff and, once dry, sanded smooth.



To protect the surrounding areas on the undersides, masking tape was used to mark out the panels to be removed © 1994 Jonathon Mock

STAGE 9

For the lower wing surfaces I protected the surrounding areas by masking out the panel with tape and after all filling and sanding was done, this was removed and the whole surface was given a light polish with an old piece of wet and dry paper. Don't forget to remove the obsolete outer

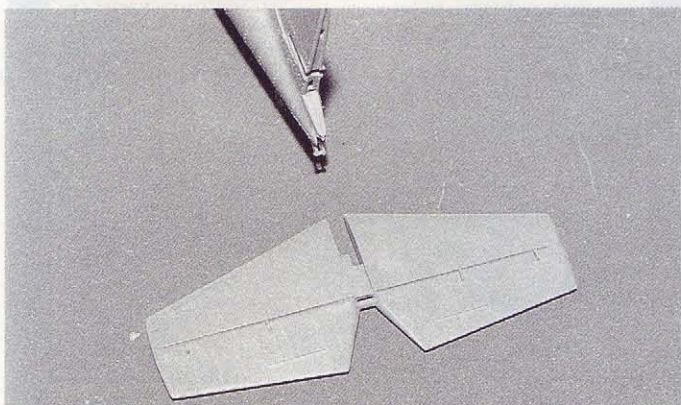
gun blisters too. Panel lines were rescribed and the rivet detail was reinstated using a dressmakers tracing wheel. For the undersurfaces, an acetate template was used to scribe in the new, oblong-shaped access panel. The outer gun openings were also filled and the remaining positions were bored out in preparation for stainless steel barrels at a later stage.



Straight from the box : Tamiya's neat little Pratt and Whitney R-1830 engine © 1994 Jonathon Mock

STAGE 10

The engine consists of two separate rows of cylinders, the rear items moulded to a firewall/bulkhead that also includes the transmission blocks on the other side. The engine was sprayed in a gun metal colour with the push rods and ignition harness picked out in silver with the wiring in black, before a final wash of black/brown acrylic to bring out the subtle detail. The gear casing is also a separate part which was painted in a glossy mid-grey and given a wash of black before fixing to the engine. The interior of the cowling was sprayed dark grey.



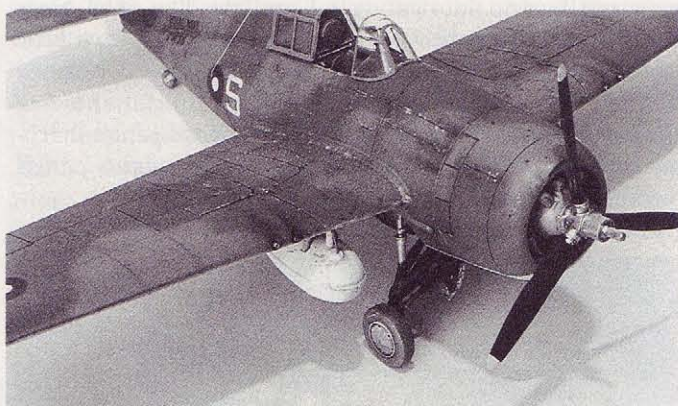
Tamiya's one-piece tailplanes feature a handed tab for foolproof assembly © 1994 Jonathon Mock

STAGE 11

Fixing the wings to the fuselage was simplicity itself with the joins falling across actual panel lines and I was able to get the upper wing roots to butt tightly to the fuselage. Another neat Tamiya touch are the tailplanes which ingeniously lock into the fin via a handed tab, followed by the rudder - I was able to leave these tow parts off to ease painting. Apart from cleaning up the usual fuselage seams and the wing trailing edge fillet, no further sanding was required.

The wheel wells, flap interiors and cockpit were all masked off and the model was given a light misting of

Halfords Grey Primer to spot for flaws before the final paint scheme.



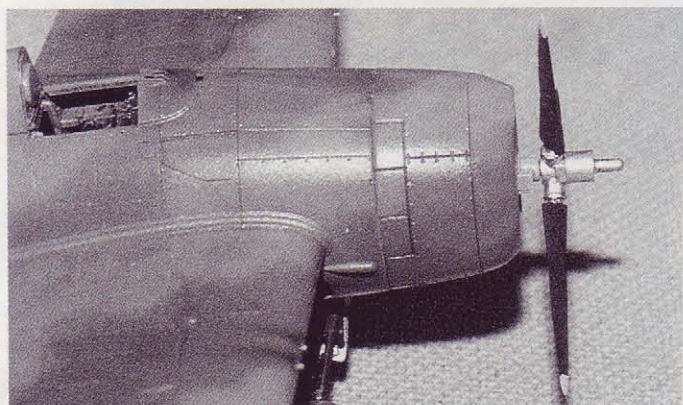
The finished Martlet

STAGE 12

Finishing - I wanted to finish my Wildcat as JV435 of No. 890 Squadron, Fleet Air Arm based on *HMS Atheling* during WW11. This aircraft featured the standard FAA dark sea grey and dark slate grey finish but bore blue and white roundels in the usual six positions. For the underside I used Tamiya's Sky (XF-21), lightened with a dash of white and thinned with Isopropyl Alcohol. I applied a couple of coats and, once dry, airbrushed slightly darker shades of the same colour along the control surfaces, wing fold and major panel lines. The same method was used for the dark sea grey (Humbrol 164) upper surfaces, before spraying the dark slate grey (Humbrol 31) camouflage freehand - apparently local climatical conditions, as well as the ever present salt water spray, caused the paint to weather and bleach to such an extent that many aircraft appeared to be finished in a single 'muddy' colour on top. The camouflage colours were left to harden for a few days before applying several coats of Halford's Clear Lacquer, misted on at first before building up to a tough, gloss finish.

The blue and white roundels presented a challenge, a scavenge through my spare decals yielded markings of the right colours but of the wrong proportions. The nearest match I could find were a sheet of 1:48 scale SEAC markings from Almarks, which were perfect in size and proportion but feature azure blue centres. I overcame this by using a punch and die set and solid white decal. Centre sections of the right diameter were punched out and applied to the SEAC roundels on the model. A little pressure and use of a decal solvent ensured that the decals bedded down over the raised rivets on the fuselage. The serial number came from various decal oddments and all the markings were sealed with an additional coat of Clear Lacquer before spraying Humbrol's Flatcote over the model for the final sheen. Applying wear and tear to a model requires just as much care as a pristine paint job. By studying plenty of reference photos I was able to determine where, and why, the Wildcat got grubby. First there were obvious things like streaks from the gun muzzles which were airbrushed on with dark grey acrylic. The exhaust stains were a mix of brown/black with additional passes of light grey. The areas around the engine cowling were treated with several washes of glossy brown and black to simulate oil leaks, taking care to blend the stains in the direction of the airflow.

Much the same applied to the fuselage panels around the ventral fuel tank. The wing fold hinge was given a few spatters of glossy brown, where the folded wing would occasionally drip lubricating oil and the like. The areas around the wing walk were usually well scuffed, so a little use of black/brown pastel dust and a cotton swab toned down the paintwork here. Areas of bare metal showing through were applied using a light grey pastel pencil sharpened to a needle point and applied to the gun access panels and the pilot's foot rests.



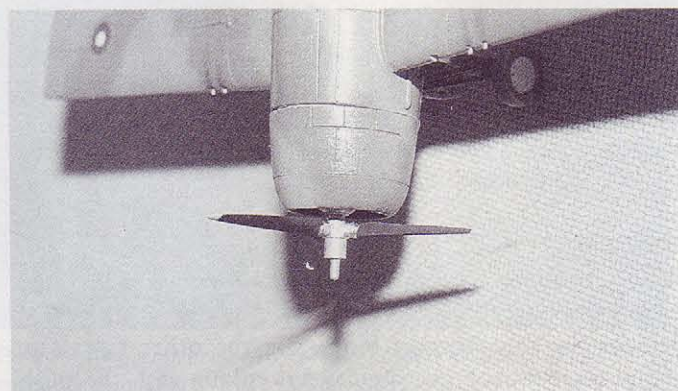
A prop too far : if left unaltered, Tamiya's propeller sticks out too much from the cowling.... © 1994 Jonathon Mock

STAGE 13

Final Details - I drilled out the fuselage positions for the aerial wires and these were fabricated from invisible thread (monofilament line). A drop of superglue was applied to the end of each piece of thread and these were fixed into posi-

tion with a drop of accelerator. The threads were then attached to the mast and run along the tail, before being pulled taut and superglued in place. The tensioners were picked out with a touch of black paint.

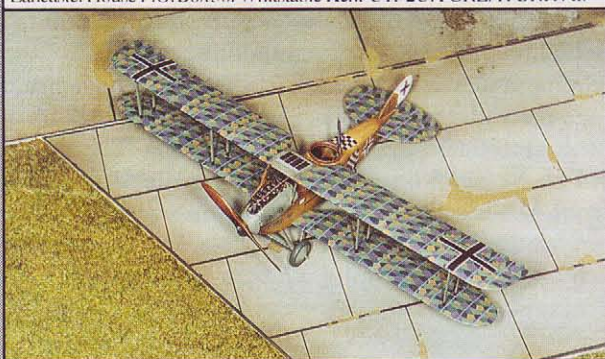
The props were sprayed dark grey/off black with aluminium used for the hub. The yellow tips were touched in using the marked guides moulded to the tips. A quick test fitting of the propeller to the engine revealed something not quite right with it - the propeller juts out too far from the cowling making the nose seem a little too skinny. As the whole engine and cowling assemblies had slotted into place beautifully I knew the fault wasn't of my own making. My solution was to trim some 2 to 3mm off the end of the gear casing using one of Airwaves etched micro-saws. The prop was slipped back into place and the fault was instantly cured.



...Though a little surgery on the gear case with a razor saw effects a cure! © 1994 Jonathon Mock

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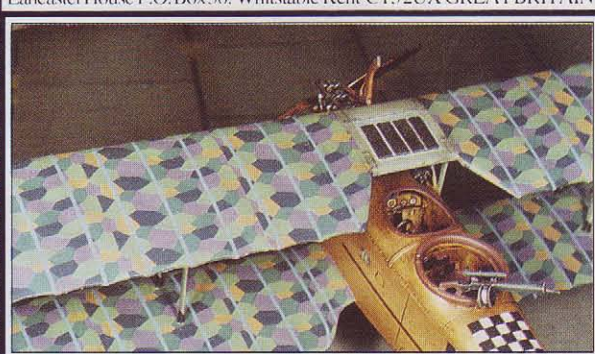
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STAGE 14

The new machine gun barrels were cut from stainless steel tube, mine scavenged from an old bottle of Revell's "Contacta" liquid cement. I scored the tube by rolling it under a knife blade and then snapping the required lengths off - trying to cut through stainless steel is a fast way of dulling new blades. The wheels had a couple of 'flats' sanded to the bottom of the tyres before being painted dark grey. An additional dry brushing with dark brown imparted a nice rubber look to the tyres. The outer hubs are separate parts, these were sprayed Sky, the rear hubs being black. I touched in the wingtip and dorsal navigation lights with red and green, these being glazed with a drop of Humbrol's Clearfix. The red, green and orange lamps on the underside of the fuselage came from the M.V. Lenses range. The Martlet V did sometimes carry 58 gallon external tanks and I felt that they added character to my model so I fitted them. For the fuel attachment hose I fixed a small sliver of rubber strip between the wing and the circular cap on the tank. The kits gunsight was added as were windscreen and canopy, all secured with PVA adhesive.

Feisty feline

With the benefit of hindsight I would have lightened my tin of Humbrol Slate Grey with a dash of white as the subsequent varnishing coats make it look a little too dark on my finished model, but then exact colour matches and scale effect are a matter of personal interpretation and the colours on my Martlet don't look out of place. If an FAA/RN Martlet V doesn't grab you then how about a USN FM-1 in the grey and white anti submarine finish?

Tamiya's Wildcat has thankfully saved me the trouble of trying to turn the ancient Monogram effort into something half-decent, and the result is far superior than anything I could have achieved with the older kit. Some kits may dimensionally look like the real thing but lack certain 'essence' - Tamiya's Wildcat is so faithful you can almost hear it purr...

If they follow the trend for a 'family' of kits, perhaps Tamiya might repackage this kit one day with a new set of wings for the non-folding F4F-3 and its almost endless colour schemes. If not then we still have this very superior rendering of the F4F-4 which is a superb starting point for any Wildcat/Martlet model. Hats off to Tamiya for a fine replica of the very first of Grumman's fighting felines.

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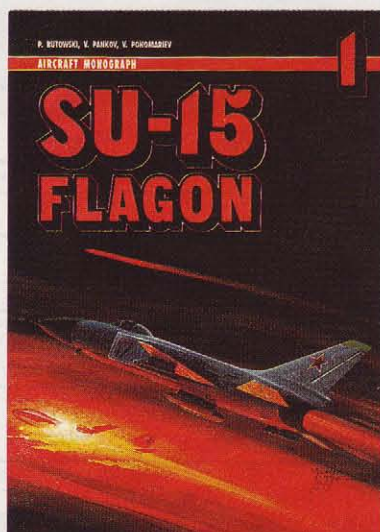
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MODELLING BOOKSHELF

Scale Aviation Modeller has recently received three new titles from Poland. Published by Ajencja A.J. Press, they are the first in a new series covering aircraft from the Soviet Union and the Luftwaffe.

The first of these features the Sukhoi Su-15 *Flagon*, which achieved notoriety in 1983 when Korean Air Lines flight 007 was downed by R-98 missiles fired from a *Flagon*.

The book itself is an A4-size softback of some 48 pages, illustrated throughout with both black and white and colour photographs. There is an absolute wealth of modelling material contained within its covers. Beginning with side views of the initial designs for the type, the artist has

provided plans for four basic models plus dozens of scrap views, including plans for the missiles carried by the type. Additionally, there is a double-page spread featuring no fewer than 86 different inscriptions found on the airframe!

Backing up the artwork are close-up photographs of bulges, intakes, undercarriage bays, leg assemblies and the like. The cockpit is similarly covered with drawings backed with colour photographs of the panels. Finally, Jaroslaw Wróbel has provided two pages of airbrushed side and plan views. The informative text covers the entire development and service career of the *Flagon*, with an additional sections on specifications.

Volumes 2 and 3 cover the

Heinkel He 111 and Messerschmitt Bf 110 respectively. Each contains 56 pages plus covers and, similarly, contain a wealth of information. The He 111 book, for instance, contains no fewer than 16 pages of black and white scale plans plus eight pages of colour. The text covers the production and service history of the type, plus export customers, camouflage and markings and a technical description.

The Bf 110 volume contains 11 pages of black and white plans plus six pages of colour, along with numerous other plans – including no fewer than four covering armament.

The English editions of these books have been edited by the likes of Barry Ketley and Richard Ward. All in all, we would recommend them to anyone with an interest in these fields. Next to appear are volumes on the Focke Wulf Fw 190 and the first of four on Luftwaffe camouflage and markings – we await their arrival with interest.



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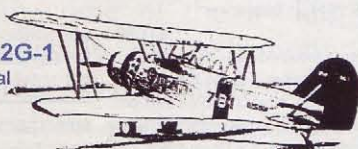
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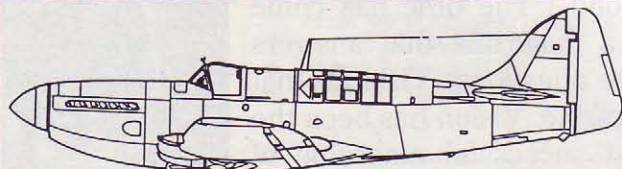
Many of these experiments were on weapons fits and the type carried numerous equipment including the

Bv 246 'Hailstone' gliding bomb. One of these trials included the fitment of a carrier for an air-dropped torpedo. The BT style of anti-shiping weapon had already been carried by a Fw 190, but a true air-dropped torpedo was something new. Two airframes, Werke Nr 871 and 872, were sent to the torpedo testing centre at Eckernforde near Schleswig and later on to Hexengrund testing establishment at Gotenhafen. These tests were, however, unsatisfactory. At a later date the D-12 series of the Fw 190 would again be tested to carry a torpedo but by then the war situation was hopeless and little came of

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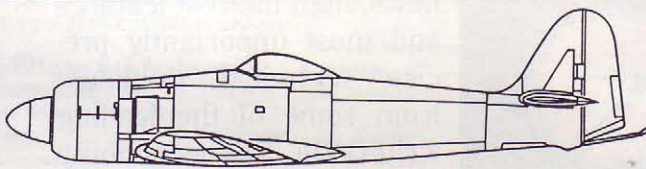
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it. To allow the A-5 airframe to carry a large torpedo the tailwheel leg was extended, the fin was also enlarged and armament was reduced to two wingroot-mounted MG151s. The LTF 5b torpedo was carried on a centreline ETC501 rack.

This new kit from MPM is based on the Academy-Minicaft Focke Wulf Fw 190A-8/F-8 kit. As well as the 62 injected moulded pieces from the Academy kit, there are eight limited run pieces produced by MPM. The Academy injected canopy and windshield are utilised and a fret of etched brass detail parts (23 pieces) and acetate instrumental panel are included to complete the package. Of the 62 pieces in the Academy kit, 32 are not used.

Construction is relatively easy, although some amount of time is required to clean up the limited run parts produced by MPM. The Academy kit is, in my opinion, not a good representation of the Fw

190 and most of the detail is over accentuated. The fuselage is new, to include that enlarged tail unit and surface detail is a little heavy; the texture of the plastic is what I can only describe as 'gritty'. The cockpit interior uses both Academy pieces and new etched brass detail parts. The instrument panel is etched brass with an acetate backing piece. The decking above the panel is also etched brass and you need to remove the moulded decking from the new fuselage halves before it can be fitted. I must say that I thought all this was far too involved and I would have liked to have seen the option of using brass or plastic pieces in this area, similar to that offered in MPM's other recent kit, the A7M. The gun decking (Part No.A12) is not a good fit and a little brute strength and super glue are the only way to get it into position. The wing/fuselage joint can also be a bit of a problem and once again I think a little force is

the only option to ensure you don't have a huge gap to fill each side. The LTF 5b torpedo is very nice and all the air-tail area is furnished as etched brass – it all seems complicated at first but I found it all fitted together with little fuss. The use of a 'production' injection moulded kit means that the time needed to build this kit is greatly reduced, so once most of the major assembly is completed the overall colour scheme is applied.

There is only one option given in the kit: this is W/Nr 871, coded TD+SI. The airframe is in an RLM 65/71/75 scheme, which is not common and looks quite different. The under surface is RLM 65 Hellblau and the upper surface is RLM 71 Dunkelgrun and RLM 75 Grauviolett. The under surface colour extends up the fuselage sides and over the tail and in true Luftwaffe style the upper surfaces are then mottled over it. All of my colours were applied with an airbrush and I used the excellent

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enamels now available from Aeromaster. The colours I used were RLM 65 (9021), RLM 71 (9024) and RLM 75 (9026). The interior of the wheel wells and oleo legs are RLM 02 Grau (9020) and the cockpit interior is RLM 66 Schwartzgrau (9022). Finally, the torpedo body is natural metal (Xtracolour 502) and its tail is black (Humbrol 21), the propeller is RLM 70 Schwartzgrun (9023), the wheel hubs are gloss black (Humbrol 21) and the tyres are dark grey (9010 - 'Tyre Black').

With all the painting completed and dry the decals were applied. As with most MPM offerings nowadays these are very thin and must be moved off the backing sheet directly into place on the model. I used Aeromasters AERO Set and AERO Sol decal solutions and found they settled the decals down on the model very well indeed. Once all these decals were in place the model was given an overall coat of matt varnish and the cockpit canopy was un-masked.

Although the idea is sound I cannot say that I like the use of the Academy kit as the basis for this model. I appreciate that the use of this kit has kept the retail price down, but unfortunately the Academy kit is not a good representation of the type to start with. Of course, having said that what else could they base it on? The Hasegawa kit? Not if you wanted to see change from £20.00! If this kit had been made completely in the limited run method I am sure many would have complained about the 'waste' and 'duplication'



NORTHROP P-61A BLACK WIDOW

Designed by Jack Northrop, the P-61 was the heaviest aircraft to bear a 'P' (Pursuit) prefix. Designed as a purpose-built night-fighter, the

done by MPM, but I personally would have preferred it.

All comments aside, the kit is still a good representation of the A-5/U14 and one I am sure most Luftwaffe modellers will want to have. The construction methods and medium used by MPM mean that this is a kit for the intermediate and experienced modeller only. But if you can put up with the inaccuracies of the Academy Fw 190, included those moulded-on cannon bulges on each wing (remember that the wing armament was reduced in this variant), then I am sure you will like this model. My thanks to Hannants for the chance to make this model.

P-61 featured a long fuselage between tail booms. Powered by 2,800 horsepower Pratt & Whitney R-2800s, it had a top speed of 370mph. The three-crew P-61 had immense fire power: four 20mm cannon in the fuselage – some carried a remote control dorsal turret containing four .50in machine guns. Problems encountered due to blanketing of the horizontal tailplane when the dorsal turret was transversed led to it being locked in the forward position. Fitted at first with the SCR-720A radar and later with the SCR-720C, the Black Widow was

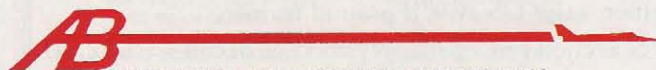
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indeed a formidable aircraft. It served in many theatres and many roles. One more unusual task fell to the P-61s of the All Weather Flying Center at Wilmington, Ohio, which in May 1948 were used to chase tornados during Operation *Thunderstorm*.

Everyone remembers the old Airfix P-61 kit: it was one of the first 'real' kits I ever made on my own. When Dragon announced it was making P-61A and P-61B kits I was really looking forward to their arrival. It has been quite a wait but here is the first – the P-61A. Moulded in a light grey plastic, the kit consists of 89 fret, six clear and six etched steel pieces. The panel lines are all lightly engraved and the detail is excellent.

Construction is achieved in ten stages, all of which are well illustrated in the instructions. The cockpit is nicely detailed, including the escape hatch in the floor. However, the seats (D7) in both the front and rear cockpits appear incorrect – all my sources show it to have a frame side with arms, not an almost armchair-like shape as depicted in the kit. Sidewall detail is good, but I'm sure dedicated super detailers could still find something to add. No seat belt harnesses are included so you'll have to get these from another source, such as Eduard, Reheat or Airwaves. As the P-61A had no upper turret fitted I could not see the use in fitting the sighting devices (D6). I may be wrong on this point, but in any case I'd have like to have seen some guid-

ance in regard to this item in the instructions. The whole of both rear and forward cockpit areas are sprayed Interior Green (Humbrol 158) and don't forget the decals (numbers 5, 11 and 35). The 20mm cannons (parts D3 and D4) are moulded separately and convincingly protrude from openings in the lower fuselage. Before you finally secure the fuselage halves (A2 and A5), don't forget to open up the holes in the top, shown in step two of the instructions, if you intend to make colour option one.

Stage five would have you open up the holes for the four wet points: this depends on the type you make, and I'll return to this point later. The most superb addition is the inclusion of the clear radome complete with the SCR720 radar scanner and power units. Before I started this kit, I was informed by a friend with some glee that the fit of this kit left a lot to be desired. Having had little trouble in making this kit all I can advise is that you follow the rule of a dry run for each assembly *before* cementing it together. I certainly did and as a result I needed to trim a few areas here and there, but I only needed three dabs of filler and a small piece of 5 thou card on the port underwing root joint on the entire model!

As the P-61 had a tricycle undercarriage nose weight is required, but the scanner and clear radome make its addition difficult. The instructions suggest that weight is added to the engine nacelles (D19) but I found it easier to assemble

the engine and add weight between the engine insert (D10) and the cooling grills (D13). If this is not enough, add more to the forward bulkhead of the tail booms (A1, A3, A4 and A6). The colour option you pick determines whether you fit the upper tank (C28 and C29) or the blanking plate (C32).

Now back to the question of wet points. The machines depicted in the kit, 42-5528 and 42-5547 came from the P-61A-1-NO and P-61A-5-NO series respectively. However, the fitting of wet points for auxiliary tanks only came in with the P-61A-11-NO, which neither of the depicted aircraft are. Also, 42-5528 was well-known as it had a ventral auxiliary tank fitted for its long-haul trips to Saipan. I do not believe that the tanks are applicable to any of the options in this kit and are simply a carry-over for the future P-61B kit. This is another grey area on which I would have liked to see some guidance given in the instructions. Finally, before a colour scheme is applied, I should point out that the antenna mounting posts on either side of the nose are too far forward. They should really be cut off and repositioned so they don't interfere with the correct positioning of the nose art decals.

Having completed the model, less undercarriage, I applied an overall colour scheme. The usual US scheme of Neutral Grey 43 underneath and Olive Drab 41 on top is indicated and I used Aeromaster paints for this. Each

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colour was applied with an airbrush, which allowed me to experiment with 'shadow-shading' and I was pleased with the results. The colours used were Neutral Grey (9043), Olive Drab (9040) and Faded Olive Drab (9041). The complicated framework of the P-61's cockpit canopy is a masking nightmare, but is eased with the use of Parafilm M. Once the overall colours are dry the model is sprayed with gloss varnish before the decals are applied.

By now it is obvious that I went for 42-5528 'Jap Batty' of the 6th NFS based at Saipan in 1944, but the other option is 'Borrowed Time', the first P-61 to shoot down a V-1. Piloted by Lt Herman Ernst, it was based with the 422nd NFS in England in 1941. This aircraft had a yellow nose with *sharkmouth* (sharkmouth fans please note!) and it still had invasion stripes on the undersurface of each tail boom. Whilst on the subject of 42-5547, it should be noted that the aircraft had a 'Memphis Belle' style of fig-

ure on the nosewheel hub which is not included in the decals.

All of the decals went on with little trouble and reacted well to Microsol and Microset decal solutions. The only markings which are a bit tedious are the red wing walking boundary lines, simply because they are long, thin strips that are easily broken or curl up. Once dry the gloss finish is toned down with matt varnish and the undercarriage, wheels, doors and etched steel aerials are fitted. Final tasks include airbrushing some exhaust stains on, adding the aerial leads and removing the canopy masking.

Overall this is an excellent kit, well detailed and superbly manufactured. The lapses with the kit's instructions that cause confusion in regard to those drop tanks and the sighting devices are a nuisance (but you are aware of them now!). The incorrect location of the antenna posts is rectifiable, but annoying. The only possible errors are the lack of a fabric finish on the short span ailerons, or any trim tabs,

plus the fact that the trim tab control horns are reversed on the horizontal stabilisers. Finally, the propeller blades should have a taper at the base, referred to as a 'cuffed propeller'. The commonality of the mouldings to produce the A and B models has lead to some errors and this is a shame; the fit is also not great from the box, but if you take your time and make everything fit as you go along I am sure you will not be disappointed with this model. Some experience with more involved injection moulded kits and a knowledge of etched detail parts make this a kit for the more advanced modeller, but I would thoroughly recommend it to all of you who think you are man (or woman) enough to handle it.

My thanks to Dragon models for the supply of this excellent kit and I look forward immensely to the arrival of the P-61B 'Lady in the Dark'!

Very highly recommended, and can I have another one please?

Richard Franks

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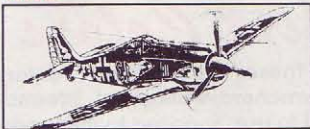
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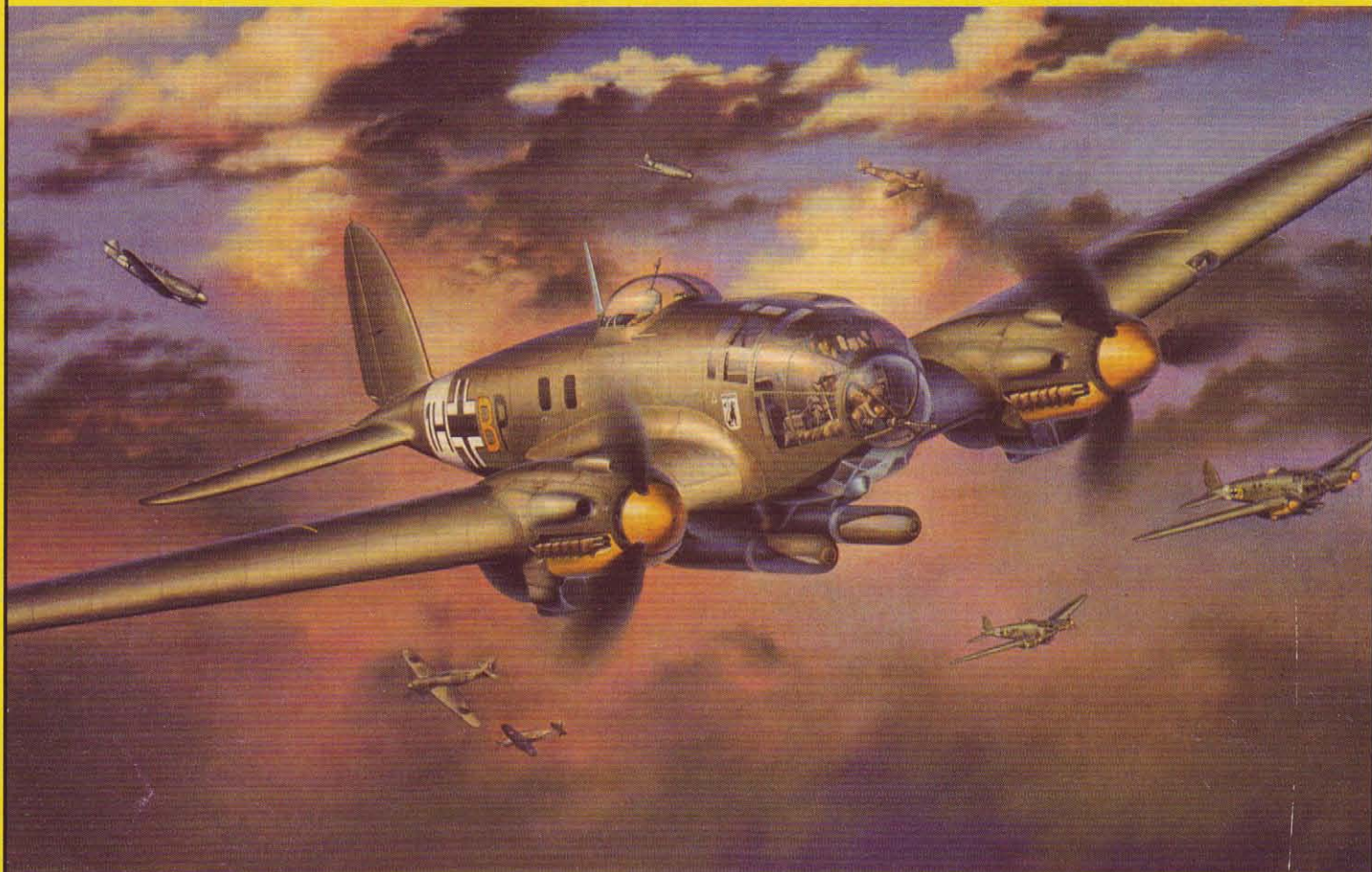
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